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Binder 078, Gorgoderidae A [Trematoda Taxon Notebooks]

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GORGODERIDAE Looss, 1901

Family diagnosis. — Body smooth, divided into a narrower forebody and a more or less enlarged hindbody. Suckers well developed. Acetabulum usually projecting prominently. Pharynx present or absent. Ceca simple or sinuous, reaching to near posterior extremity, where they may be occasionally united. Testes postacetabular, inter- or extracecal, or overlapping ceca, symmetrical or asymmetrical, two or more in number. Cirrus pouch absent. Genital pore median, between intestinal bifurcation and acetabulum. Ovary submedian or nearly median, intercecal, postacetabular, in testicular zone or a little anterior or posterior to it. Receptaculum seminis and Laurer's canal present or absent. Vitellaria double, compact or lobed, postacetabular, intercecal, occasionally extracecal and pretesticular (*Probolitrema*). Uterus in hindbody, overreaching ceca or confined to intercecal field. Excretory vesicle tubular, sometimes Y-shaped. Parasites of fishes, amphibians and reptiles.

Type genus: *Gorgodera* Looss, 1899.

Key to subfamilies of Gorgoderidae from amphibians

Body divided into a conical forebody and a foliate hindbody ..... Phyllodistominae
Body not divided into two distinct regions ..... Gorgoderinae

Gorgoderinae Looss, 1899

Subfamily diagnosis. — Gorgoderidae: Body elongate, with smooth lateral margins. Oral sucker subterminal, no pharynx. Esophagus rather short, ceca simple, terminating at or near posterior extremity. Acetabulum prominent, in anterior third of body. Testes two, tandem, or several and divided into two longitudinal rows behind ovary. Vesicula seminalis pre-acetabular, no cirrus pouch. Genital pore median or submedian, postbifurcal. Ovary median or submedian, in middle third of body. Vitellaria compact or lobate, symmetrical, intercecal, preovarian. Uterine coils confined to intercecal field of hindbody, or intruding into extracecal fields; eggs embryonated. Excretory vesicle with tubular stem.

Key to genera of Gorgoderinae

Testes two ..... *Gorgoderina*
Testes several, in two longitudinal rows ..... *Gorgodera*

The two gorgoderid genera reported for reptiles belong to the subfamily Plesiochorinae.

Plesiochorinae n. subfam.

Subfamily diagnosis. — Gorgoderidae: Body stout, somewhat constricted in acetabular region. Oral sucker large, pharynx present. Esophagus very short; ceca more or less sinuous, reaching to near posterior extremity. Acetabulum very large, pre-equatorial. Testes lobate or branched, symmetrical, postacetabular, overlapping ceca. Seminal vesicle convoluted anterodorsal to acetabulum. Genital pore pre-acetabular. Ovary lobate, submedian, immediately behind acetabulum. Vitellaria obed or not, symmetrical, immediately postacetabular, pretesticular, overlapping ceca. Uterus inter- and extracecal. Excretory vesicle Y-shaped, bifurcating between two testes. Parasites of turtles.

Key to genera of Plesiochorinae

Posterior end of body and margin of acetabulum bicornuate laterally ..... *Bicornuata*
Posterior end of body and margin of acetabulum not bicornuate laterally ..... *Plesiochorus*

From Kaw,1950

Family Gorgoderidæ Looss, 1901.

Looss (1901) erected the family CORGODERIDAE with tw sub-families, Gorgoderinae and Anaporrhutinae and under th latter, he included *Anaporrhutum* Ofenheim, 1900, *Prcbolitrema* Loos 1901 and *Plesiochorus* Looss, 1901. Subsequently several gener were added—*Petalodistomum* Johnston, 1912, *Staphylorchis* Travasso 1926, *Dendrorchis* Travassos, 1926, and *Nagmia* Nagaty, 1930. I his review on sub-family Anaporrhutinae, NAGATY (1930) remove *Dendrorchis* from the sub-family and fused it with the genu *Phyllodistomum* under Gorgoderinae.

Looss (1902) placed under the sub-family Gorgoderinae, *Phyllo distomum* Braun, 1899 (syn. *Spathidium* Looss, 1899), *Gorgodera* Looss 1899, *Gorgoderina* Looss, 1902 and subsequently *Catoptroides* Looss 1902. LINTON (1910) added the genus *Xystretum* and TRAVA SO (1920) erected the genus *Macia* for *Catoptroides magnum* an *C. aluterae* MacCallum, 1917. CZAKI (1926) added *Microlecithus* bu YAMAGUTI (1934) and EHALERAO (1937) regarded it synonymous t *Phyllodistomum*. LEWIS (1935), LYNCH (1936) and BHALERAO (1937) disregarded the genus *Catoptroides* and placed all its species unde the genus *Phyllodistomum*. PANDE (1937) considered the genu *Gorgoderina* also synonym to *Phyllodistomum*. DAYAL (1938) adde two more genera—*Gorgotrema* and *Phyllochorus* and while placing the former genus under the sub-family Gorgoderinae, no reference is made about the sub-family of the latter.

The present communication contains the description of Phyllo-distomes collected from Kasmhir.

Семейство *Gorgoderidae* Looss, 1901

I. Подсемейство *Gorgoderinae* Looss, 1901

1. Род *Gorgodera* Looss, 1899.
   - а. Подрод *Gorgodera* (Looss, 1899) Pigulevsky, 1952.
   - б. Подрод *Antodera* Pigulevsky, 1952.
   - в. Подрод *Extremodera* Pigulevsky, 1952.
   - г. Подрод *Mediodera* Pigulevsky, 1952.
   - д. Подрод *Postodera* Pigulevsky, 1952.
2. Род *Gorgotrema* Dayal, 1938.

II. Подсемейство *Anaporrhutinae* Looss, 1901

1. Род *Anaporrhutum* Ofenheim, 1900.
2. Род *Petalodistomum* Johnston, 1913.
   - а. Подрод *Petalodistomum* (Johnston, 1913) Pigulevsky, 1952.
   - б. Подрод *Staphylorchis* (Travassos, 1920) Pigulevsky, 1952.
3. Род *Probolitrema* Looss, 1902.
   - а. Подрод *Probolitrema* (Looss, 1902) Pigulevsky, 1952.
   - б. Подрод *Reduxotrema* Pigulevsky, 1952.

III. Подсемейство *Phyllodistomatinae* Pigulevsky, 1952

1. Род *Phyllodistomum* Braun, 1899.
   - а. Подрод *Phyllodistomum* (Braun, 1899) Pigulevsky, 1952
   - б. Подрод *Catoptroides* (Odhner, 1902) Pigulevsky, 1952.
   - в. Подрод *Microlecithus* (Ozaki, 1926) Pigulevsky, 1952.
   - г. Подрод *Vitellarinus* (Zmeev, 1936) Pigulevsky, 1952.
2. Род *Dendrorchis* Travassos, 1926.
3. Род *Gorgoderina* Looss, 1902.
   - а. Подрод *Gorgoderina* (Looss, 1902) Pigulevsky, 1952.
   - б. Подрод *Gorgorimma* Pigulevsky, 1952.
4. Род *Phyllochorus* Dayal, 1938.
5. Род *Xystretum* Linton, 1910.

IV. Подсемейство *Plesiochorinae* Pigulevsky, 1952

1. Род *Plesiochorus* Looss, 1901.

Gorgoderinae Looss 1901

Small to medium-sized distomes with sometimes narrow sometimes widened hindbody, with relatively long esophagus passing thru a musculosen pharynx. End part of the genital ducts weakly developed, seminal vesicle small, sac-like, ductus ejaculatorius and metraterm thin and short. Testes more or less obliquely behind one another inside the ceca. Inner female organ with Laurer's canal and without seminal receptacle; vitellaria near together.

Genera: Gorgoderina Looss
Gorgodera Looss
Phyllodistomum (Braun) Looss
Catoptroides Odhner

Gorgodera Looss, 1899

Generic diagnosis. — Gorgoderidae, Gorgoderinae: Hindbody elongate, with smooth lateral margin. Oral sucker subterminal. No pharynx. Esophagus slender. Ceca simple, terminating at or near posterior extremity. Acetabulum prominent, in anterior third of body. Testes divided into several, round or irregularly shaped bodies, arranged in two longitudinal rows or in zigzag row, in postovarian intercecal field. Vesicula seminalis pre-acetabular. No cirrus pouch. Genital pore median, between acetabulum and intestinal bifurcation. Ovary median or submedian, in middle third of body. Vitellaria compact or lobed, symmetrical, intercecal, pre-ovarian. Uterine coils confined to intercecal field or may intrude into extracecal fields of hindbody. Eggs embryonated. Excretory vesicle tubular, divided into paired arms at its anterior end. Parasitic in urinary bladder of amphibians.

Pigulewsky (1952) divided this genus into 5 subgenera (*Gorgodera, Antodera, Extremodera, Mediodera* and *Postodera*).

Genotype: *G. cygnoides* (Zeder, 1800) (Pl. 41, Fig. 512), syn. *G. loossi* Sinitzin, 1905, in *Rana esculenta, R. temporaria, R. ridibunda, R. clamitans, Hyla arborea, Bombinator igneus;* Europe, N. America.

Cercaria macrocerca in *Cyclas* and *Pisidium* — Wagener (1857), Kowalewski (1902); *Sphaerium, Pisidium, Epitheca, Rana* — Mathias (1925).

Other species:

G. amplicava Looss, 1899 (*Distoma cygnoides* var. A of Bensley, 1897, renamed) in frogs and toads; North America. Also in *Pseudotriton* and *Amblystoma;* U.S.A. — Rankin (1937).

Cysticercous xiphidiocercaria develops in *Musculium partumeium*, encysts in *Helisoma antrosa*. Final host may be either *Rana clamitans* or *R. catesbiana* — Krull (1935); additional second intermediate hosts: *Physa, Lymnaea, Helisoma, Pseudosuccinea* — Krull (1936), *Cambarus* sp. and *Rana pipiens* (exper.) — Martin (1937). Flame cell pattern ($2 \times 8 \times 4 = 64$) worked out by Byrd and others (1940). Cercariae are ingested with food or in respiratory currents into tadpoles of several anuran species including *Rana catesbiana, R. clamitans, R. palustris* and *Hyla versicolor*. Moreover, several species of snails, *Pseudosuccinea columella* and *Physa heterostropha*, are natural and experimental metacercarial hosts. Larval urodele, *Amblystoma maculatum* and odonatan nymph, *Enallagma* sp. may be metacercarial hosts. Encystment is accomplished in vitro and ectopically in tadpole tail. Final hosts *Rana* spp., *Bufo americanus* and *Amblystoma maculatum* — Goodchild (1948).

G. amplicava var. *asiatica* Skarbilovich, 1950, in *Rana* sp.; Kirghiz.

G. australiensis Johnston, 1912, in *Hyla aurea* and *Lymnodynastes peronii;* Australia.

G. asiatica Pigulevski, 1946, in *Rana ridibunda;* Middle Asia.

G. circava Guberlet. 1920, in *Rana catesbiana*; Oklahoma.

G. dollfusi Pigulevski, 1946, in *Rana ridibunda;* Middle Asia.

G. granatensis Gonzalez Castro, 1942, in *Rana esculenta;* Granada.

G. japonica Yamaguti, 1936, for *G. cygnoides* of Seno, 1907, and of Yoshida, 1915, in *Rana nigromaculata;* Japan.

G. media Shtrom, 1940, in *Rana esculenta ridibunda;* Kirghisia.

G. microvata Fuhrm., 1925, syn. *G. asymmetrica* Fuhrm., 1925, in *R. esculenta;* Switzerland. Also in *R. ridibunda;* Morocco.

G. microvata orientalis Joyeux et Baer, 1928, in *Rana temporaria;* Europe.

G. minima Cort, 1914, in *Rana pipiens, R. catesbiana;* U.S.A. Also in *Siren lacertina;* Louisiana.

G. pagenstecheri, Sinitzin, 1905 (*cygnoides* of Pagenstecher, renamed) in *Rana esculenta, R. ridibunda, Bufo vulgaris;* Europe. *Sphaerium, Pisidium, Epitheca, Agrion* — in Sprehn (1930).

G. pawlowskyi Pigulevsky, 1952, in *Rana* sp.; Russia.

G. varsoviensis Sinitzin, 1905, in frogs; Warschau. Also in *Rana ridibunda;* Tunis. *Sphaerium, Epitheca, Agrion* — in Sprehn (1930).

Gorgodera	cygnoides	microovata	asymetrica	pagenstecheri	varsoviensis	minima	circava	amplicava
Author	Zeder	Fuhrmann	Fuhrmann	Szinitzin	Szinitzin	~~Szinitzin~~ Cort	~~Cort~~ Guberlet	Looss
Date	1800	1924	1924	1905	1905	1912	1920	1899
Length	- 10 mm.	5 - 9 mm.	7 mm.			1. to 2 mm.	2.5 - 3.7 mm.	3 - 5 mm.
Width	- 1 mm.	0.6 mm.	1.2 mm.				0.5 to 0.65 mm.	0.75 mm.
oral sucker		0.31 to 0.36	0.4			0.2	0.3 to 0.37	0.3
acetabulum		0.6 to 0.75	0.66		2 to 2½ times oral sucker	0.39	0.6 to 0.75	0.7 to 0.75
Testes	4 + 5, 5 + 4	4 + 5, 4 + 6	3 + 4	5 + 4, 4 + 4	4 + 5	5 + 4	4 + 5	5 + 4
ovary	reniform	oval	oval	lobed	lobed	weakly lobed	trilobed	lobed
Vitellaria gland	lobed	very deeply lobed; 2 x 7 lobes	asymetrical 12 lobes	deeply lobed	deeply lobed	2 x 9-11 lobes	2 x 6-8 lobes	2 x 8-10 lobes
Eggs	47 - 48 by 30-31 μ	23 - 26 by 18-19 μ	32 - 34 by 20 μ	40 x 28 μ	32 x 25 μ	32 x 22 μ	30 x 23 μ	?
Hosts	Rana esculenta	Rana esculenta	R. esculenta	R. esculenta R. temporaria	R. esculenta R. temporaria	R. catesbiana R. pipiens	R. catesbiana	R. catesbiana R. clamitans R. virescens
"	R. temporaria Bufo vulgaris Hyla arborea? Bombinat. igneus?							
"								
Country	Europe	Switzerland	Switzerland	Poland	Poland	N. A.	N. A.	N. A.

From: Fuhrmann, 1925
Bull. Soc. Neuchateloise
Sci. Nat. 49: 131-137.

Gorgodera (*Gorgodera*) *cygnoides* (Zeder, 1800)

Синонимы: *Distomum cygnoides* Zeder, 1800, nec *Distomum cygnoides* в понимании Leidy, 1851

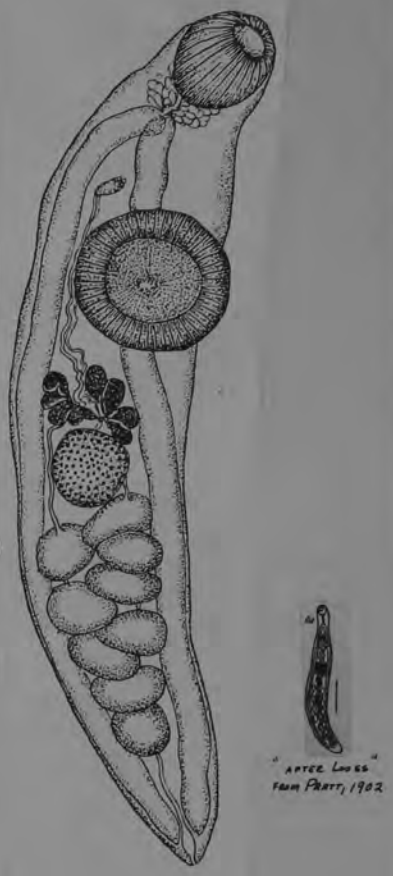
(Рис. 225 и 226)

Хозяева: лягушки (*Rana esculenta, R. ridibunda, R. temporaria, R. arvalis, R. pipiens?, R. palustris?, R. calamitans?, R. catesbiana?, Hyla arborea?, Bombina bombina?, Bufo bufo?, Pseudotriton rubor?, Salamandra salamandra?, Gyrinophilus porphyriticus?*).

Локализация: мочевой пузырь.

Места обнаружения: Франция, Германия, Польша, СССР (Минск, Киев, Харьков, Донская обл., Сев. Кавказ, Московская обл., Муром, Ср. Азия), Канада?, США?.

Историческая справка. Впервые этот вид, повидимому, наблюдал еще Лошге (Loschge, 1785), о чем можно судить по прилагаемым рисункам, заимствованным из работы вышеназванного автора. Однако Лошге не определил найденного паразита до вида и не дал подробного описания строения червя. Через 25 лет после Лошге, Цедер (1800) также обнаружил в мочевом пузыре лягушки подобного паразита, описал его и назвал *Distomum cygnoides*. Впоследствии этот вид находили или описывали многие исследователи. Так, например, под тем же родовым и видовым названием, данными Цедером, этого паразита описывает Рудольфи (1809, 1819), Зибольд (1835, 1837), Дюжарден (1845), Дизинг (1850) и другие. При этом оказалось, что большинство исследователей находили данный вид у лягушек семейства *Ranidae* в Европе, а начиная с Лейди (Leidy, 1851) — и в Америке. В отдельных же случаях этого паразита обнаружили: Геде (Gede) у *Bombina ingneus*, Бремзер у *Hyla arborea* (по Diesing, 1850), а Лейди (Leidy, 1851) и у саламандр. Эти данные, без критического анализа, приводит в своей обзорной работе также и Уолтон (Walton, 1938). Однако при ревизии горгодерид, предпринятой Лоосом (1899), вышеназванные паразиты вначале были выделены в отдельный род *Gorgodera*, который позже тем же Лооссом (1902) был разделен на два рода: *Gorgodera* и *Gorgoderina* (см. выше). К какому из этих двух родов принадлежали виды, упоминаемые Дизингом, и плохо описанный вид Лейди, судить трудно. Ни достаточного описания червей, ни рисунков найденных паразитов в этих работах нет. Вот, например, какую характеристику паразита под наименованием *Distomum cygnoides* приводит Лейди (1851): «Тело желтовато-белое», кзади от брюшной присоски вытянутое, сплющенное, веретенообразное, с заостренным задним концом. Шея



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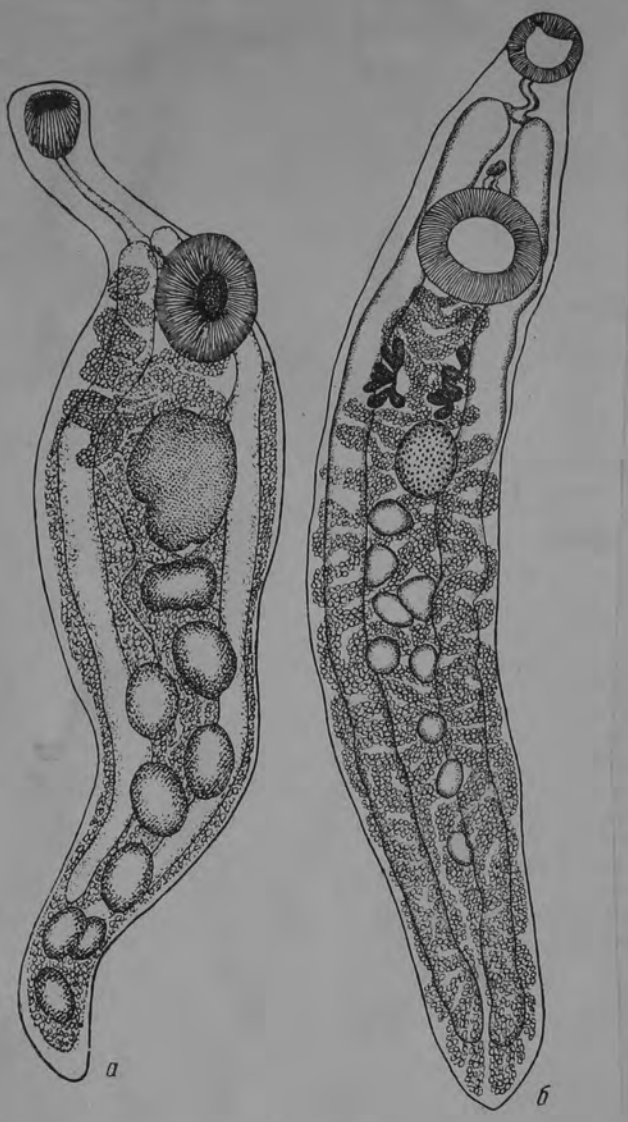
б



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Gorgodera (*Gorgodera*) *cygnoides asiatica* (Skarbilovitsch, 1950)

Синоним: *Gorgodera amplicava* var. *asiatica* Skarbilovitsch, 1950

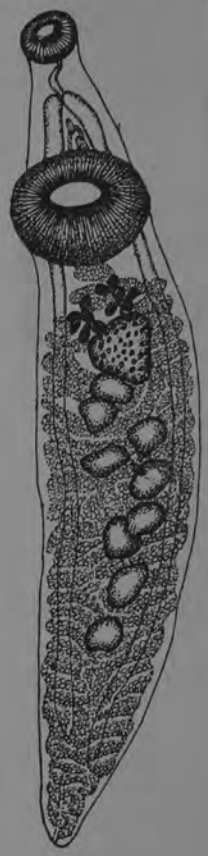
(Рис. 228)

Хозяин: лягушка (*Rana* sp.)

Локализация: мочевой пузырь.

Место обнаружения: СССР (южная Киргизия).

Историческая справка. Паразит, описанный Т. С. Скарбилович (1950) под именем *G. amplicava* var *asiatica*, был доставлен во Всесоюзный институт гельминтологии (Москва) в количестве 1 экземпляра из Южной Киргизии (окрестности оз. Сары-Челек). Скарбилович дает следующую характеристику паразита: «У *G. amplicava* тело веретенообразной формы, заостренное кпереди и кзади; все девять семенников почти одинакового размера и шаровидной формы. У нашей *G. amplicava* var. *asiatica* форма тела напоминает огурец; оно заострено кпереди и округлое кзади. Семенники, лежащие справа, крупные, имеют удлиненную, поперечно вытянутую форму; семенники, лежащие слева, меньшие по объему и имеют шаровидную форму». Любезно предоставленный мне Т. С. Скарбилович препарат для переисследования помог разобраться в видовой принадлежности *G. amplicava* var. *asiatica* Skarbilovitsch, 1950. Проанализировав по оригинальному препарату паразита описанного Скарбилович подвида и сравнив его с другими видами рода *Gorgodera*, мы пришли к иному выводу, чем Т. С. Скарбилович. Для американского вида *G. amplicava* является характерным весьма крупная брюшная присоска, до четырех раз превосходящая ротовую. У паразита же, описанного Скарбилович, брюшная присоска едва вдвое превосходит ротовую, что характерно для паразитов подрода *Gorgodera*, а не *Antodera*, к которому принадлежит *G.* (*Ant.*) *amplicava*. Характер строения семенников, описанный Скарбилович, также свойственен представителям подрода *Gorgodera*, а не *Antodera*, у которых семенники снабжены небольшими лопастями. Наконец, форма тела с тупо закругленным задним концом у паразита, описанного Скарбилович, несомненно, является особенностью, свойственной данному подвиду. Точно так же и компактное расположение семенников с плохо различимыми правой и левой группами их дает основание к выделению этого паразита в новый подвид *G.* (*Gor.*) *cygnoides*, к которому во всех остальных отношениях он стоит очень близко. Обсудив все эти положения с Т. С. Скарбилович, мы, по ее предложению, взяли на себя несколько дополнить описание нового подвида.



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GORGODERA AMPLICAVA Looss, 1899

I have taken many specimens of *Gorgodera* from the bladder of *Rana catesbeiana* both at Houston and at Huntsville, Tex. Although this fluke is known to have a wide host range, I have been unable to find it in any other local species of frogs. Guberlet (1920) has described *Gorgodera circava* from the bladder of *Rana catesbeiana* in Oklahoma. This fluke differs from *G. amplicava* in ratio of the oral sucker to the acetabulum, the number of vitellarian follicles, the lobation of the ovary, and the possession of an ejaculatory pouch. The number of vitellarian follicles and the lobation of the ovary are in my material very variable characters. Furthermore, the ratio of the oral sucker to the acetabulum in my material covers the entire range reported for both *Gorgodera amplicava* and *G. circava.* The variations, however, showed a strange chronological sequence. In the early part of my collecting I killed my specimens by pouring fixative over them, after the manner recommended by Guberlet. Later I discovered that these flukes could be shaken from the bladder easily if the dish containing them was first thoroughly chilled by exposure to an ice-salt mixture. The degree of cold also completely relaxed the flukes, and they could then be killed with any cold fixative. The flukes killed by the latter method always possessed acetabula more than 2.5 times larger than the oral sucker, while many of those killed by the former method possessed relatively smaller acetabula. I was unable to distinguish any differences in the male genital system in my material, but as the ejaculatory pouch has not been mentioned in earlier descriptions, it can not be regarded as certainly absent. Therefore, it seems to me that *Gorgodera circava* is a synonym of *G. amplicava.*

G. circava sucker ratio 1:1.8 to 1:2.3

Cort says G. amplicava ratio 1:2.5 to 1.3

Gorgodera (*Antodera*) *amplicava* Looss, 1899

Синонимы: *Distomum cygnoides* var. «A» Bensley, 1897; *Gorgodera minima* Cort, 1912

(Рис. 230)

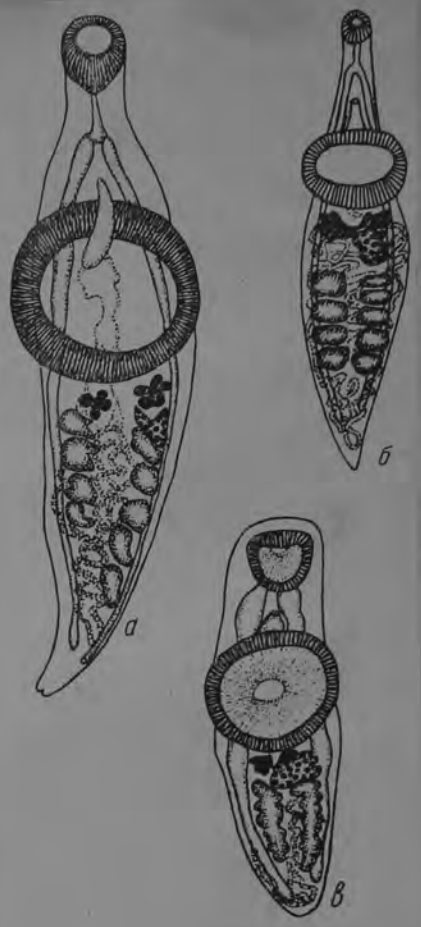
Хозяева: лягушки (*Rana clamitans*, *Rana catesbiana*, *Rana virescens*, *Rana pipiens* из семейства *Ranidae*, *Ambystoma maculatum* из семейства *Ambystomidae* и *Pseudotriton montanus* из семейства *Plethodontidae*).

Локализация: мочевой пузырь.

Места обнаружения: Канада (Торонто), США (Иллинойс, Массачузетс).

Историческая справка. При исследовании лягушек в Северной Америке Бенсли (Bensley, 1897) обнаружил паразитов, которых определил как *Distomum cygnoides*. Однако, поскольку у одного паразита было два семенника, а у другого девять, Бенсли отнес второго к вариации «В», тогда как первого к вариации «А». Двумя годами позже Лоосс (1899), установив новый род *Gorgodera* с типом *G. cygnoides*, неоднократно найденным у европейских лягушек, выделил паразитов, обнаруженных Бенсли у американских лягушек, в новые виды, назвав вариацию «А» — *Gorgodera amplicava*, а вариацию «В» — *Gorgodera simplex*. Через три года после этого тот же Лоосс (1902) отделил от рода *Gorgodera* виды с двумя семенниками и создал для них новый род *Gorgoderina* с типичным видом *Gorgoderina simplex*. Еще через десять лет Корт (Cort, 1912) нашел в мочевом пузыре лягушек Северной Америки паразитов, которых, благодаря их незначительной величине и чрезвычайно тесному расположению семенников, сливающихся в две группы, выделил в новый вид—*Gorgodera minima*. Этот вид просуществовал почти двадцать пять лет, пока Кролл (Krull, 1935) и Гудчайлд (Goodchild, 1948) не обнаружили его вновь в той же Северной Америке и изучили цикл развития червя. На основании этих работ стало совершенно очевидным, что Корт имел дело с молодой формой, находящейся на определенной стадии маритогонии, уже давно известного вида — *Gorgodera amplicava*. Таким образом, *Gorgodera minima* как самостоятельный вид перестал существовать.

Описание вида. Форма тела паразита веретенообразно-ланцетовидная с суженными передним и задним концами и расширенной средней частью тела кзади от брюшной присоски. Тело червя несколько уплощено в дорзо-вентральном направлении. Кутикула гладкая. Длина паразита до 4 мм, наибольшая ширина 0,75 мм. Ротовая присоска округлой формы, 0,3 мм в диаметре. Брюшная присоска также округлой формы, выдается за края тела паразита, в 2—4 раза крупнее ротовой; размер ее 0,7—1,2 мм



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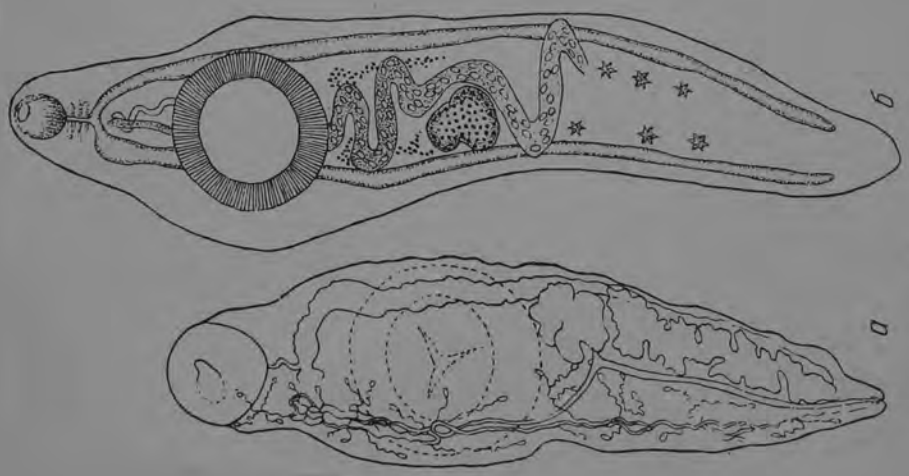

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—OVER—

Gorgoderidae

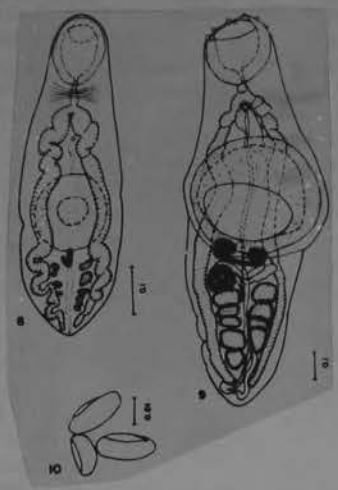
4. *Gorgodera amplicava* Looss, 1899
(Figs. 8-10)

Hosts: *Orconectes palmeri creolanus* (Creaser, 1933), *Procambarus clarkii* (Girard, 1852)

Location: On lower quadrant of stomach wall, usually at level of gastric mill

Localities: *O. palmeri creolanus* from stream drainage into Bayou Sarah, about 1 mile S Mississippi State Line (West Feliciana Par.); *P. clarkii* from Ama, Bonnet Carre spillway, Sarpy, Maringouin Edgard (Lafourche Par.), Buras (Plaquemines Par.), Pierre Pass (Assumption Par.), Venice (Plaquemines Par.), and 1.7 mi. N. Jct. La. Hwy. 20 on La. Hwy. 309.

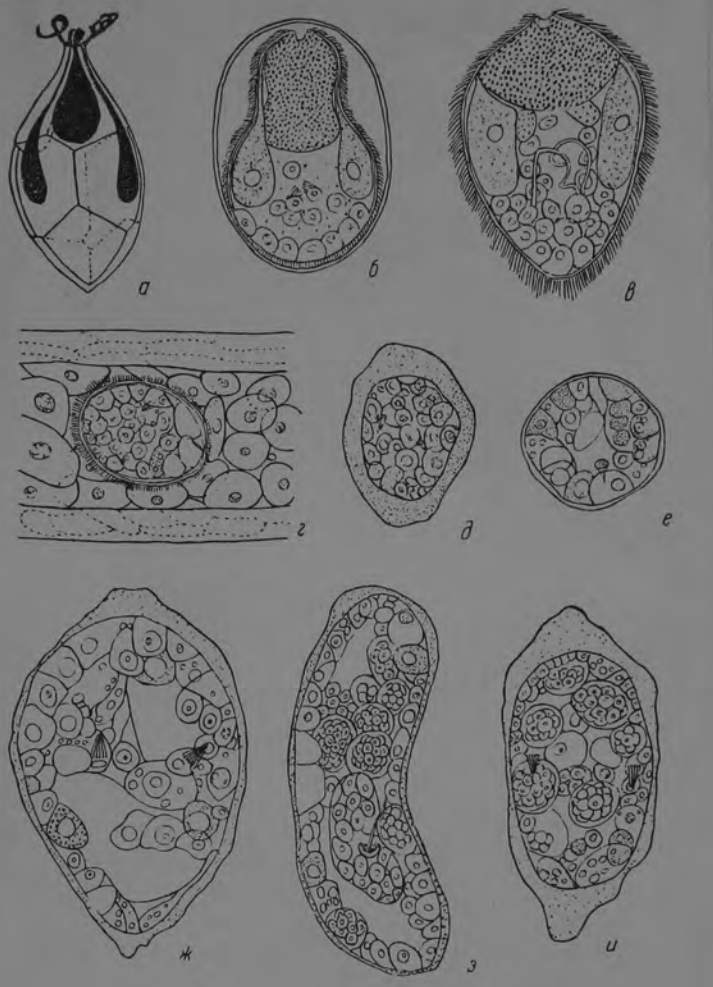
Discussion: Krull (1935) described the life cycle of this species. The partial life-cycle of *G. amplicava* has been experimentally established in this laboratory in young *Rana clamitans* Latreille and adult *Amphiuma means* Cuvier. *Rana catesbeiana* Shaw is one definitive natural host of *G. amplicava* in Louisiana, and has been shown by Penn (1950) to feed on crayfishes. *Hyla cinerea* (Schneider) and *Chaenobryttus gulosus* (Cuv. & Val.) were refractory to infection. Judging from the site of encystment, I suspect that crayfishes become infected by ingesting the cercariae. Almost all crayfishes collected in Sarpy, an oil field near Norco, Louisiana, were infected with *G. amplicava*. The species has been previously reported from crayfishes by Krull (1936).



8. *Gorgodera amplicava*, excysted metacercaria; 9. same, adult from experimental infection of *Amphiuma*; 10. same, eggs;

From Sogandares, 1965

Gorgodera amplicava Life History from Goodchild,1948



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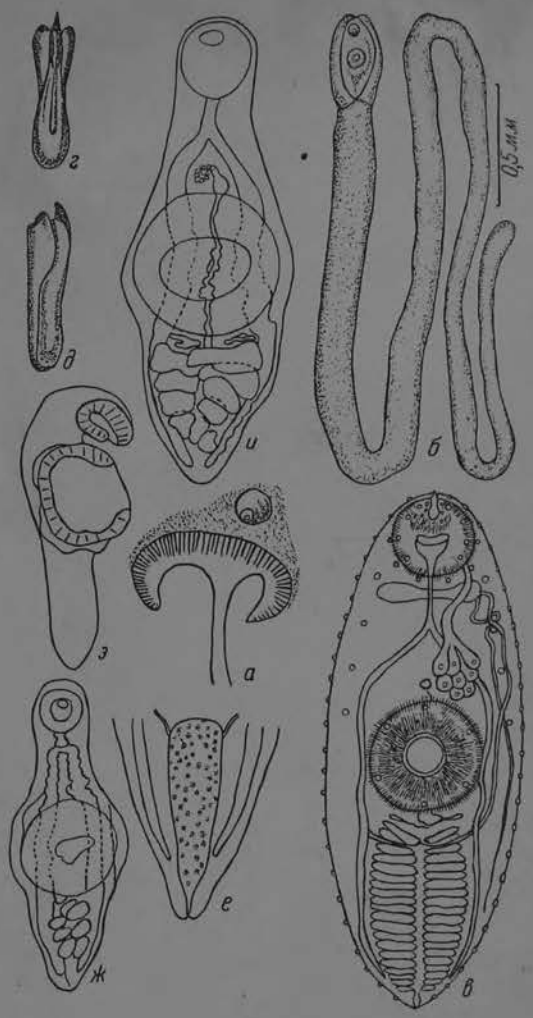


232. *Gorgodera* (*Antodera*) *amplicava* Looss, 1899 (по Кроллу, [1935)

Gorgodera (*Mediodera*) *asiatica* Pigulevsky, 1945

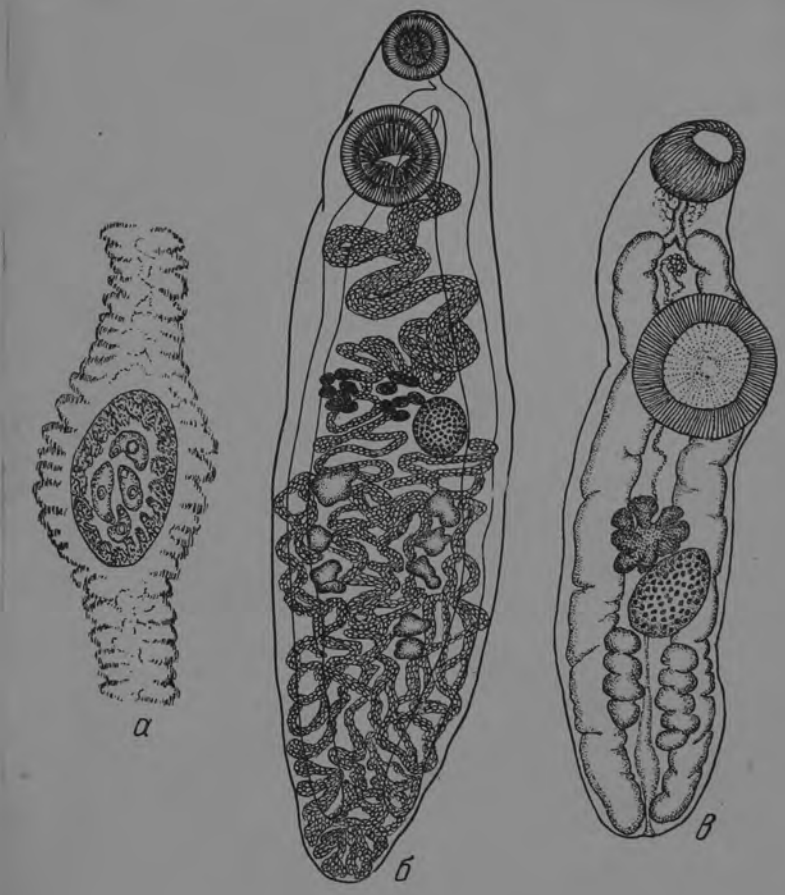
(Рис. 239 и 240)

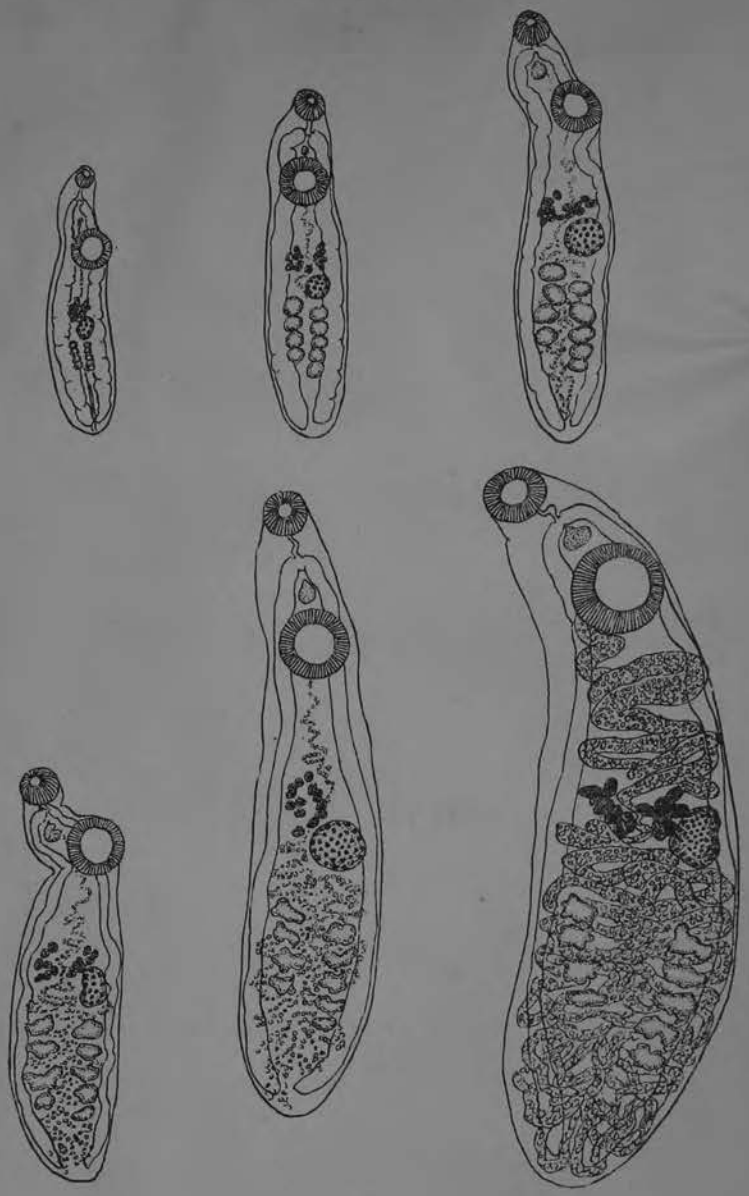
Хозяин: лягушка (*Rana ridibunda*)

Локализация: мочевой пузырь.

Место обнаружения: СССР (Нижнее Поволжье, Средняя Азия, Северный Кавказ).

Историческая справка. Этот вид был обнаружен нами в 1933 и 1934 гг. в Средней Азии (Узбекистан) близ селения Келес. Позже, при исследовании паразитофауны озерной лягушки из окрестностей Саратова, мы снова обнаружили этот вид. Наконец, среди препаратов трематод лягушек, собранных 35-й Союзной гельминтологической экспедицией в Среднюю Азию в 1926 г., предоставленных нам академиком К. И. Скрябиным, четыре экземпляра также оказались *G. asiatica* Pigulevsky. Описанный нами вид является паразитом озерной лягушки и распространен в Нижнем Поволжье, на Северном Кавказе и в Средней Азии до Ташкента. Южнее Ташкента этот вид заменяет *G. media*, описанный Штромом (1940). Основные отличия обоих этих видов показаны в таблице 3.





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240. *Gorgodera* (*Mediodera*) *asiatica* Pigulevsky, 1944 (по Пигулевскому, 1952)
Маритогония

einfach röhrenartig, in der Nähe des hinteren Körperendes des Parasiten blind endend. Darmbifurkation ungefähr in der Mitte zwischen Mund- und Bauchsaugnapf. Ovarien, Vitellarien und Hoden im Vergleich mit Bauchsaugnapf erheblich nach hinten verschoben. Hoden schwach gelappt und aus zwei Gruppen der rechten und linken bestehend die sich an den inneren Rändern der Darmäste entlang hinziehen. Die eine Gruppe besteht aus fünf, die andere aus vier Hoden, manchmal bilden sie Gruppen von 3+4 oder 4+4. Hoden vor allem bei jüngeren Individuen meist in Reihen dicht hintereinander geordnet. Manchmal sind ein oder zwei Hoden von der übrigen Gruppe

Abb. 4. *Gorgodera asiatica* Pigulevsky, 1945, juvenile Form. (Orig.)

Abb. 3. *Gorgodera asiatica* Pigulevsky, 1945, adulte Form. (Orig.)

durch eine größere Lücke getrennt. Beide Gruppen der Hoden liegen ungefähr im mittleren Teil der Entfernung zwischen dem Bauchsaugnapf und dem hinteren Körperende. Die Gruppe mit den fünf Hoden liegt auf der Seite hinter dem Ovarium und ist im Vergleiche mit der anderen Gruppe nach hinten verschoben. Receptaculum seminis ist oval knapp vor dem Bauchsaugnapf, zwischen den Darmästen gelegen, der Cirrus fehlt. Ovarium mäßig gelappt oder oval und liegt seitlich hinter den Vitellarien. Seine Ausmaße sind 0,66×0,49 mm. Vitellarien paarig, jedes Vitellarium aus

From: Kozak, Alexander, 1973

See Reprint: Die Trematodenfauna Der Frösche Des Karpathengebietes Der Cssr
Biologia (Bratislava), 28(5): 395-350

Gorgodera (*Antodera*) *circava granatensis* Castro, 1942

Хозяин: лягушка (*Rana esculenta*).
Локализация: мочевой пузырь.
Место обнаружения: Америка (Гранада).
Описание подвида не приведено за отсутствием соответствующей литературы.

Gorgodera (Mediodera) asymmetrica Fuhrmann, 1924

Host: Rana esculenta

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Подрод *Extremodera* Pigulevsky, 1952 [1]

Диагноз подрода

Gorgodera. Паразиты веретенообразно-цилиндрической формы с несколько суженным передним концом и равномерно расширенным телом кзади от брюшной присоски. Тело червя несколько уплощено в дорзо-вентральном направлении. Брюшная присоска небольшая, превышает ротовую только в $1^1/_2$ раза и не выдается за края тела паразита. Яичник, желточники и семенники расположены близко друг от друга. Желточники лопастные, находятся недалеко от заднего края брюшной присоски. Семенники крупные, лопастные, расположены двумя группами на равном расстоянии от брюшной присоски и заднего конца тела червя. В одной группе пять, а в другой четыре семенника. Группа, состоящая из пяти семенников, лишь немного отодвинута кзади по сравнению с противоположной, состоящей из четырех семенников. Обе группы семенников четко отделены друг от друга. Петли матки находятся позади брюшной присоски между кишечными ветвями, на них и кнаружи от них.

Паразиты мочевого пузыря лягушек и жаб Австралии.

Типичный и единственный вид: *Gorgodera* (*Extremodera*) *australiensis* Johnston, 1912.

Gorgodera (*Extremodera*) *australiensis* Johnston, 1912

(Рис. 236)

Хозяева: лягушка (*Hyla aurea* из семейства *Hylidae*) и жаба (*Limnodynastes peronii* из семейства *Bufonidae*).

Локализация: мочевой пузырь.

Место обнаружения: Австралия (Новый Южный Уэльс).

Описание вида (по Джонстону, 1912). Форма тела веретенообразно-цилиндрическая. Кпереди от брюшной присоски тело червя несколько сужено, кзади от брюшной присоски равномерно расширено в виде цилиндра, заостренного в заднем конце. Тело паразита немного уплощено в дорзо-вентральном направлении. Кутикула покрыта небольшими шипиками или бугорками. Длина червя 5,7 мм, наибольшая ширина 1,76 мм. Ротовая присоска круглая, 0,38 мм в диаметре. Брюшная присоска также круглая, несколько крупнее ротовой, размером 0,589 мм в поперечном сечении. Соотношение размеров ротовой и брюшной присосок 2 : 3. Пищевод трубковидный, короткий. Ветви кишечника простые, трубковидные, немного не доходят до заднего конца тела червя. Развилок кишечника находится ближе к ротовой, чем к брюшной присоске. Семенники крупные, лопастные, расположены двумя группами на равном расстоянии от брюшной присоски и заднего конца тела червя. В одной группе пять, в

Tabla comparativa de las medidas de nuestros ejemplares y el de Johnston

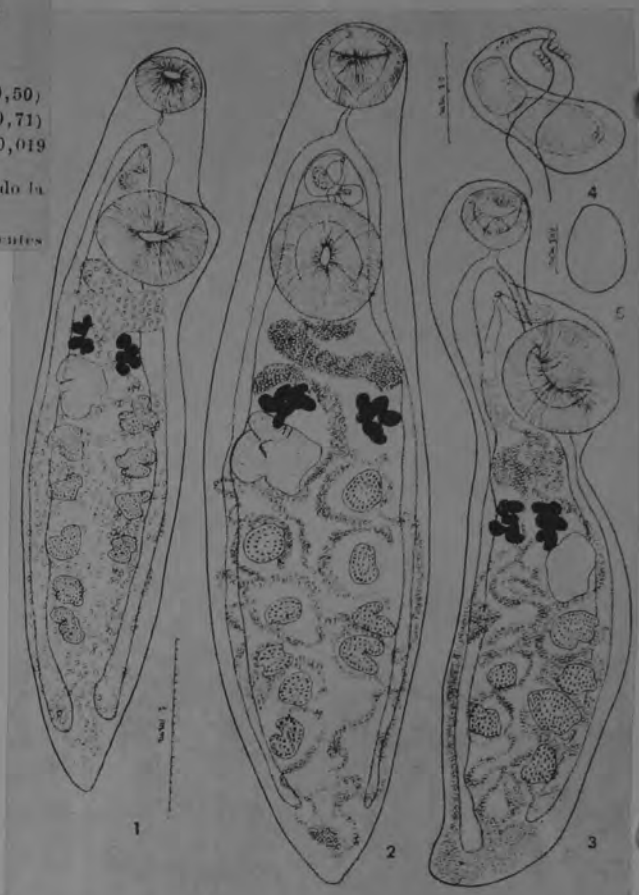
	1	2	3
Largo del cuerpo....	4,10	5,07	5,70
Ancho del cuerpo....	0,90	1,30	1,76
Ventosa oral.....	0,33 ×0,40	0,50 ×0,53	0,38 (0,50)
Acetábulo.....	0,55 ×0,67	0,70 ×0,67	0,58 (0,71)
Huevos.....	0,031×0,020	0,032×0,022	0,033×0,019

Las medidas entre parentesis son las efectuadas despues de haber ajustado la escala de medidas.

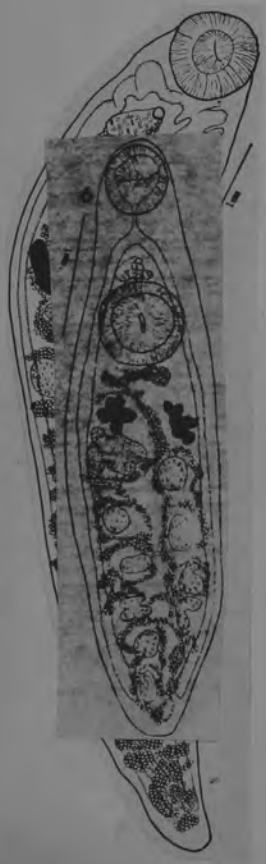
1 y 2 medidas correspondientes a nuestros ejemplares, 3 medidas correspondientes ejemplar de Johnston.

Hospedador definitivo: *Leptodactylus ocellatus* (L).
Localización: Vejiga urinaria.
Procedencia: Zárate (Pvcia. de Bs. As.) So. America

From Suriano, 1965
See reprint for description.



1 y 2, *Gorgodera australiensis* Johnston 1912. Vermes adultos; 3, *G. australiensis* forma anormal; 4, vesícula seminal rodeada por la capa de células modificadas.



was a mistake

2. **Gorgodera australiensis** Johnston 1912
(Lám. 1 ; fig. 6)

El cuerpo es ovoide, con el extremo anterior redondeado y el posterior agudo. El largo del cuerpo es de 4.40 mm y el ancho del mismo de 0.90-1.30 mm a la altura del ecuador. La ventosa oral mide 0.33-0.50 mm de diámetro ántero-posterior por 0.40-0.53 mm de diámetro transverso. El acetábulo mide 0.55-0.70 mm de diámetro ántero-posterior por 0.67 mm de diámetro transverso. No existe faringe. El esófago mide 0.20 mm de largo por 0.04 mm de ancho. Las cruras intestinales se extienden hasta 0.33-0.45 mm del extremo posterior del cuerpo.

Los testículos miden 0.13-0.24 mm de diámetro ántero-posterior por 0.13-0.25 mm de diámetro transverso.

El ovario, lobulado, mide 0.36-0.40 mm de diámetro ántero-posterior por 0.30-0.50 mm de diámetro transverso. Las glándulas vitelógenas están dispuestas en dos grupos de seis folículos cada uno. Cada folículo mide 0.13 mm de diámetro ántero-posterior por 0.036-0.042 mm de diámetro transverso. Los huevos miden 0.031-0.032 mm de largo por 0.020-0.022 mm de ancho.

from Rev. Mus. Argentino Cien. Nat. Bernardino Rivadavia, Zool. 10(15): 216-239

Gorgodera australiensis Johnston,1912

Elongated,oval worms with the usual narrower,very extensible portion anterior to the ventral sucker,and a thicker,wider and less mobile division behind it. Size moderate,average length 5.7 by 1.76 broad. Integument smooth, without spines or tubercles. Oral sucker 0.38 in diameter; ventral 0.589; ratio of oral to ventral 2:3. Genital pore just behind the inestinal fork. Testes irregular in shape and lobed, in two antero-posterior rows, five on one side, four on the other. Seminal vesicle large; no cirrus sac. Ovary lobed, large (0.375 long) always in line with the five testes. Laurer's canal present,but no seminal receptacle; a very large uterine seminal receptacle. Uterus of small caliber, but very long,with very numerous coils that extend to the lateral edges of the body. Yolk glands a pair of compact bodies of from three to six xlose-lyong lobes.
Eggs 33 by 19 μ.
Hosts: Hyla aurea and Limnodynastes peronii. In the bladder
Locality: Australia

Gorgodera (*Antodera*) *circava* Guberlet, 1920

Синоним: *Gorgodera amplicava* в понимании Harwood, 1932, nec *Gorgodera amplicava* Looss, 1899

(Рис. 235)

Хозяин: лягушка (*Rana catesbiana*).
Локализация: мочевой пузырь.
Место обнаружения: США (Оклахома).

Историческая справка. В мочевом пузыре лягушки *Rana catesbiana* из Северной Америки Губерлет (Guberlet, 1920) обнаружил паразита, которого признал за новый вид и назвал *Gorgodera circava*. Этот вид имел некоторые сходные черты строения с другим американским видом — *Corgodera amplicava*. У обоих вышеназванных видов брюшная присоска в 2—4 раза крупнее ротовой. Семенники расположены двумя тесными группами. Желточники состоят из шести овальных долек. Яичник, желточники и семенники расположены близко друг к другу, причем желточники лежат близко от брюшной присоски, а семенники далеко от заднего конца тела червя. Наконец, дефинитивным хозяином для обоих видов паразитов оказалась лягушка *Rana catesbiana*. Изучая гельминтофауну *Rana catesbiana* в Густоне, Тексасе и Гунтсвилле (США), Гарвуд (Harvood, 1932) обнаружил нескольких паразитов, которых, по его мнению, можно было с одинаковым успехом отнести как к *G. amplicava* , так и к *G. circava*. На основании этого Гарвуд высказал мысль, что *G. circava* может быть сведена к синониму *G. amplicava*. Свою мысль Гарвуд подкрепляет следующими соображениями: «Губерлет (1920) описал *Gorgodera circava* из мочевого пузыря *Rana catesbiana* в Оклахоме. Этот вид отличается от *G. amplicava* размером брюшной присоски, числом желточных фолликулов, лопастным яичником и строением концевого полового аппарата. Однако число желточных фолликулов и лопастность яичника в моем материале сильно варьировали. Кроме того, размеры ротовой и брюшной присосок в моем материале дали целый ряд переходов от *Gorgodera amplicava* к *G. circava*». В связи с этим Гарвуд высказал сомнение относительно видовой самостоятельности *G. circava*. Более поздние исследования Кролла (1935) по циклу развития *G. amplicava* привели его к противоположному мнению. Кролл считает, что губерлетовский вид *G. circava* отличается в видовом отношении от *G. amplicava* более крупным строением яиц. Необходимо отметить, что обе точки зрения Гарвуда и Кролла по поводу видовой самостоятельности *G. circava* не могут быть ни отвергнуты, ни приняты, пока остается неизвестной биология *G. circava*. Только после сравнения биологии *G. circava* и *G. amplicava* существующие разногласия будут окончательно разрешены. Поэтому описанный Губерлетом вид оставлен нами без изменения.

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Описание вида (по Губерлету, 1920). Форма тела паразита веретенообразная. Тело червя уплощено в дорзо-вентральном направлении. Кутикула гладкая. Длина паразита 2,5—3,75 мм, наибольшая ширина 0,5—0,65 мм. Ротовая присоска круглая, 0,30—0,37 мм (в среднем 0,33 мм) в диаметре. Брюшная присоска также круглая, вдвое крупнее ротовой, 0,60—0,75 мм в диаметре, окружена снаружи своего рода футляром 0,05—0,135 мм толщиной. Этот футляр, образованный кутикулярной складкой, и послужил Губерлету поводом к видовому наименованию паразита. Соотношение размеров ротовой и брюшной присосок может быть выражено, как 1 : 1,8—2,3. Пищевод трубковидный, короткий,

Gorgodera (Mediodera) cylindrica ~~n. sp.~~ MESKAL, 1970
(Text figs. 15 and 16; Pl. IV fig. 3)

Host: *Rana angolensis* (BOCAGE, 1866)
Habitat: Urinary bladder
Localities: R. Tafo, R. Dima, Fanta Stream, R. Gefersa and Sebtea Stream.

Number of Hosts		Intesnity of infection				Locality	Date of collection
Inspected	Infected	Total number of worms	Load per host				
			Min.	Max.	Mean		
13	6	23	1	11	3.8	R. Dima	7.8.67
9	5	53	1	25	10.6	R. Dima	28.8.67
4	1	3	3	3	3	R. Dima	20.11.67
18	1	5	5	5	5	Fanta Stream	28.7.66
15	2	3	1	2	1.5	Fanta Stream	24.8.68
15	1	1	1	1	1	Sebeta st.	24.7.68
14	1	1	1	1	1	Sebeta st.	26.11.68
8	6	46	2	20	7.7	Tafo st.	8.7.66
52	24	124	1	39	5.2	Tafo st.	31.8.66
15	5	52	2	29	10.4	Tafo st.	6.5.67
9	2	8	4	4	4	Tafo st.	22.11.68

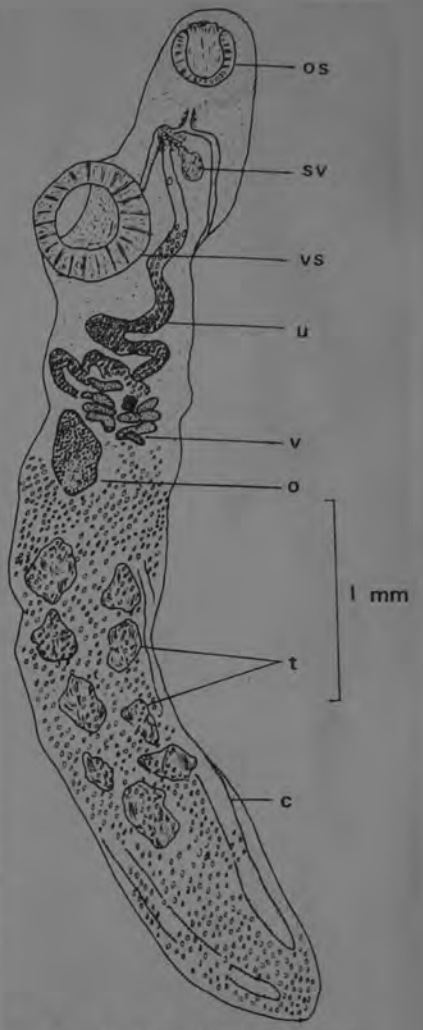


Fig. 15. Ventral view of *Gorgodera cylindrica* n. sp.

Description

General Morphology: Body is elongate and cylindrical, the lateral edges running almost parallel to each other, with almost uniform body width except for a slightly narrower pre-acetabular region and the slight attenuation toward the posterior extremity. Cuticle is relatively thin and not armed. In living state the animal is light pinkish in colour. Body length 2600—5140 (3687), maximum width 550—1100 (819). Suckers are well developed and strongly muscular. Oral sucker is situated subterminal ventral and measures 260—500 (386) by 200—460 (329). Ventral sucker is in the anterior third of body length, 350—600 (506) in diameter, and made up of strong bands of radial muscle. Ratio of oral sucker to acetabulum 1:1.2—1:1.8 (1:1.5). The main excretory vessel is a narrow tube running posteriad from just behind the ovary and along the axis of the body to open at the posterior extremity.

Digestive organs: The mouth lies at the base of the oral sucker and opens directly into a rather muscular short esophagus which is richly surrounded with secretory cells particularly on the dorsal side (Pl. IV fig. 3). The intestinal bifurcation lies in the anterior half of the pre-acetabular body. Ceca are simple and extend dorso-posteriorly to almost the hind extremity of body. Post-cecal space 200—350 (248). The inner wall of the intestinal lumen in sectioned specimens shows what appears to be thick secretions. However, no secretory cell was evident in the proximity.

Reproductive system: The gonads and vitellaria with the bulk of the uterine tube lie in the post-acetabular region, while the genital opening is at the level of or in close proximity to the intestinal bifurcation. The ovary lies just behind the vitellaria in the anterior half of body length. Laurer's canal, *receptaculum seminis* and oviduct lie on the same plane at the inner surface of the dorsal wall. The short, narrow distal end of the Laurer's canal opens into a rather wide tube which leads to the median line of the body where it joins another tube of about the same diameter coming from the *receptaculum seminis* on the other side of the body (text fig. 16). The resultant tube proceeds medio-anteriorly towards the vitelline reservoir which opens in front to the Mehlis' gland chamber. A uterine tube

—OVER—

arises from the anterior edge of the latter and proceeds a short distance anteriorly and then describes a posteriad curve. This descending limb of the uterus proceeds to the posterior extremity of the body making several transverse and dorso-ventral loops. The ascending limb likewise describes both transverse and dorso-ventral loops filling all available intercecal space and sometimes even extending to the lateral edges of the ceca post-ovarially. In front of the ovary the uterus makes a few dorso-ventral loops and then proceeds anteriorly on the dorsal side of the acetabulum. A short distance behind the genital atrium the uterus develops into a thick muscular metraterm richly supplied with secretions from the surrounding glandular cells. Secretory cells associated with the genital atrium are also found in four other groups — two of them pre-acetabularly each on either side of the median line, the other two just behind the acetabulum and intercecally (Pl. IV fig. 3).

The ovary is bipartite dorsally and more or less lobed or irregular ventrally. It measures 200—420 (306) at its longest axis by 200—400 (280) at the widest transverse line. It is situated dextral to the median line just posterior to the vitellaria. Mature ova seem to emerge from the center of the ovary toward the dorsal side from where a short narrow and muscular oviduct leads to the tubular *receptaculum seminis*. Eggs vary in size according to stages of development. Newly formed eggs measure 22.5—27.5 (25) by 13.7—17.5 (15.6). The clear white or slightly yellowish fully developed eggs in the ascending limb of the uterus measure 33—40 (36.9) by 24—27 (25.4).

Vitellaria are well developed and follicular, situated intercecally just above the ovary on either side of the median line, 5—7 follicles in each side. Vitelline reservoir is situated dorsally in between the two rows of follicles. The Mehlis' gland is also dorsal and on the median line ju anterior to the vitelline reservoir. It is oval in shape in sectioned specimens measuring up to 80 by 45.

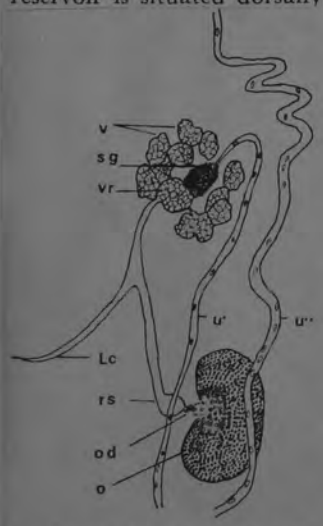


Fig. 16. Female genitalia of *G. cylindrica*

The male system consists of nine irregularly shaped and lobed testes arranged in two symmetrical longitudinal rows on either side of the median line in the posterior half of the body length (text fig. 15). The left row consists of 4 testes and the other row which is in the same side as the ovary is made up of 5 testes. Testes measures 100—288 (207) in length and 160—236 (201) in width. It has been impossible to trace the *vasa efferentia*. However, the vas deferens seems to arise post-ovarially and proceeds anteriorly on the dorsal side of the acetabulum. It becomes more evident in the pre-acetabular region where it dilates into a large sacular seminal vesicle. The latter is situated at equidistance between the oral sucker and acetabulum, and gives rise to a tubular duct leading anteriorly from its hind end.

-CONTINUED-

This tube, filled with spermatozoa, is thrown into constrictions at four places before a rather straight tube enveloped in thin walls emerges to join the opening of the metraterm at the base of a short common genital atrium that opens to the outside.

Discussion

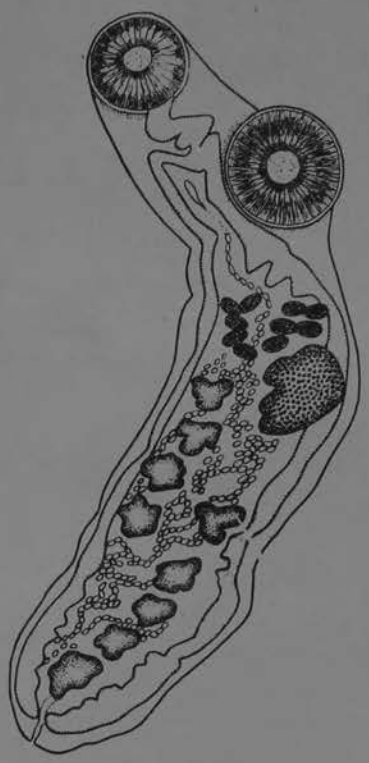
General: In a living state the acetabulum and the region anterior to it are rather active. The animal firmly clings on to the substratum with the acetabulum, and the anterior body stretches out and recoils or wriggles around while the rest of the body remains relatively inert. However, in a single instance something different was observed. The animal was accidentally cut into two at the front edge of the ventral sucker. Both pieces were unusually active, the anterior piece contracting and relaxing, and the posterior one (with acetabulum) rhythmically flipping its tail end from side to side, sometimes with the whole piece bending into a U-shape, after which it stretched out only to bend in the opposite direction. The posterior piece was more vigorous and rhythmic than the anterior, and this kind of activity lasted longer in the posterior piece (over one hour) than in the anterior (only 25 minutes), both in 0.7% saline solution.

Sectioned specimens show differing muscle patterns in the tegument of the pre- and post-acetabular bodies. In the former closely lined strong bands of longitudinal muscles stretch out between the oral sucker and acetabulum, the circular and diagonal muscles being less conspicuous. In the posterior region the diagonal muscles are the strongest and most conspicuous.

Taxonomy: Pigulevsky, 1952 (in Skrjabin, 1964) conveniently divides the genus into five subgenera, namely, *Gorgodera* (*Antodera*), *G.* (*Extremodera*), *G.* (*Mediodera*), *G.* (*Postodera*) and *G.* (*Gorgodera*). The present gorgoderid specimens do not fit into *Gorgodera sensu stricto* because of their clearly separated left and right groups of testes. The distance between the ovary and the anteriormost testis on its side is much greater than the longitudinal intertesticular space. This feature is not shared with the subgenus *G.* (*Antodera*) or *G.* (*Extremodera*).

G. (*Mediodera*) will be the most appropriate subgenus to contain the present species for, like members of the subgenus, the present material has symmetrical groups of testes which are far removed from the ovary and vitellaria. Because of the size of the ovary which is larger than that of the individual testis, the present species has less affinity to *G.* (*M.*) *pawlowskyi* Pigulevsky, 1952 from *Rana* sp. in Russia. The mid body in *G.* (*M.*) *asiatica* Pigulevsky, 1939 in *Rana ridibunda* of Asia is greatly expanded and the posterior end significantly attenuated. While in the present material body width does not vary significantly from anterior to posterior. The eggs in *G.* (*M.*) *asiatica* are smaller than in the present species. *G.* (*M.*) *media* Strom, 1940 from *Rana ridibunda* has attenuating anterior extremity with narrow mid body, and the eggs are smaller than in the present material. Besides other distinctions, the number and features of the male gonads differentiate the present Ethiopian gorgoderid from the European *G.* (*M.*) *asymmetrica* Fuhrmann, 1924 from *Rana esculenta*. In *G.* (*M.*) *asymmetrica* the testes are 3 and 4 and entire while in the new species the number is 4 and 5 and the surface is irregular if not lobed. The present material comes close to *G.* (*M.*) *pagenstecheri* Sinitsin, 1905 from *Rana temporaria* and *Rana esculenta* of Europe. However, the two differ in size and shape of the body, size of egg and presence or absence of secretory cells. The body in *G. pagenstecheri* is larger while its eggs are smaller than in the present material. No esophageal gland or secretory cells associated with genital pore have been described in *G. pagenstecheri*. As a result the present specimens appear to represent a new species *G.* (*M.*) *cylindrica*. To the best of the author's knowledge, no species of *Gorgodera* has yet been reported from Africa south of Sahara except for one undescribed specimen reported from *Ptychadena mascareniensis* in Malagasy (Richard et al. 1968).

Gorgodera (Postodera) dollfusi Pigulevsky,1945



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Gorgoderidae

from Combes, 1968

GORGODERA EUZETI Lees et Combes, 1967

G. euzeti a été décrit par Lees et Combes (1967), d'après des exemplaires recueillis chez *R. temporaria* et *B. bufo*.

Description

Les dimensions sont données d'après 30 individus mûrs, montés en préparations *in toto*.

Corps (fig. 6) :

Il est très allongé, aplati dorso-ventralement, extrêmement déformable sur le vivant.

Ses dimensions sont les suivantes (l'épaisseur est mesurée sur coupes sériées) :

— longueur : 3,80 à 11,50 mm (moyenne 5,9);
— largeur : 0,73 à 1,80 mm (moyenne 1,12);
— épaisseur : 0,30 (au niveau de l'ovaire) à 0,55 mm (au niveau de la ventouse ventrale).

Cuticule :

Elle est mince (4 μ) et lisse.

Ventouses :

Elles sont circulaires et légèrement papilleuses.

La ventouse orale a un diamètre de 297 à 754 μ (410).

La ventouse ventrale est approximativement située au 1/6 antérieur du corps; elle a un diamètre de 820 à 903 μ (585).

Le rapport ventousaire VO/VV est égal à 0,71.

La distance entre les ventouses (mesurée entre l'ouverture buccale et le centre de l'acétabulum) est de 630 à 1.486 μ (992).

Le rapport distance entre ventouses/longueur du corps est égal en moyenne à 0,17.

Appareil digestif :

La cavité buccale donne directement accès à l'œsophage; il n'existe pas de pharynx.

L'œsophage est court : 126 à 686 μ (440).

La bifurcation intestinale est située à peu près à mi-chemin entre les deux ventouses.

Les cæcums latéraux, peu sinueux, se terminent à une distance assez variable de l'extrémité postérieure du corps.

La distance entre l'extrémité du cæcum situé du côté de l'ovaire et l'extrémité postérieure du corps varie de 57 à 709 μ (286). La distance entre l'extrémité du cæcum situé du côté opposé à l'ovaire et l'extrémité postérieure du corps varie de 69 à 537 μ (234).

Sur coupes sériées, les cæcums, de section sub-circulaire, montrent un épithélium fortement aplati.

Appareil reproducteur femelle :

L'ovaire, de forme un peu irrégulière, est en général faiblement lobé, parfois réniforme. Il est situé juste en arrière des vitellogènes.

Son diamètre antéro-postérieur varie de 240 à 697 μ (390), son diamètre transversal de 137 à 537 μ (287).

L'oviducte mesure de 200 à 400 μ de longueur.

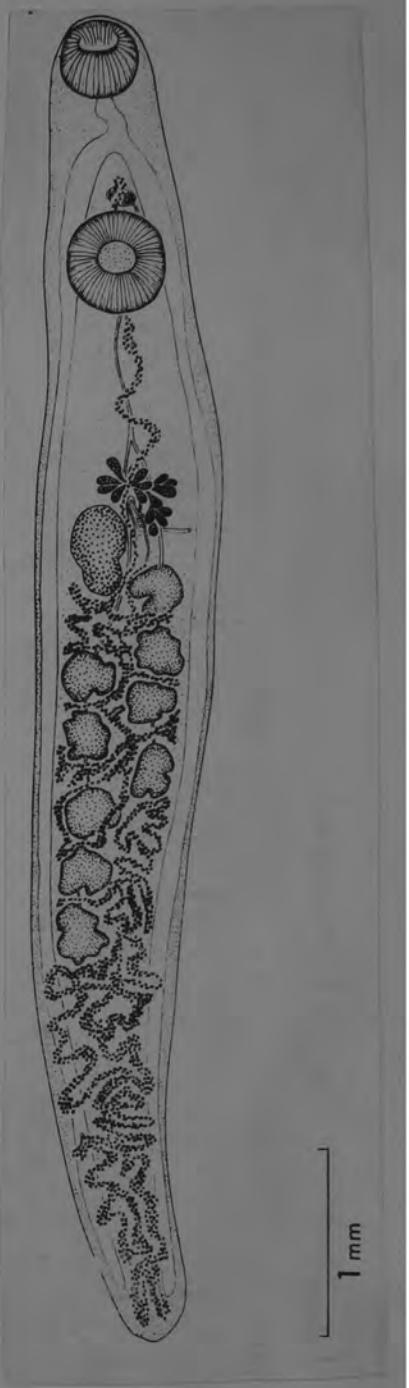
Les vitellogènes comprennent 6 à 9 follicules de chaque côté, le nombre 8 étant le plus courant. Ils sont situés en arrière de la ventouse ventrale, à une certaine distance de celle-ci (environ 1 mm). Chaque follicule mesure en moyenne 130 sur 80 μ. Il existe 2 vitelloductes transverses et 1 vitelloducte médian, tous très courts, aboutissant à l'ootype.

La glande de Mehlis est située entre les deux paquets de follicules vitellins, autour de l'ootype.

Le canal de Laurer, long et rectiligne, s'ouvre par un pore latéro-dorsal en arrière de la zone des vitellogènes.

La partie descendante et la partie ascendante de l'utérus forment de nombreuses sinuosités dans la région post-ovarienne. La branche ascendante se continue en avant de l'ovaire et aboutit au pore génital commun; sa partie terminale est ciliée. Le pore génital, médian, est situé entre le niveau de la bifurcation intestinale et celui du bord antérieur de l'acétabulum.

Les œufs, de couleur jaune paille, mesurent de 20 à 37 μ (moyenne 27) sur 17 à 25 μ (19). Ils sont dépourvus de clapet : les œufs de la portion terminale de l'utérus renferment des miracidiums bien formés qui s'échapperont après la ponte par éclatement de la coque; cet éclatement est consécutif à une variation de pression osmotique (passage de l'œuf, de l'urine dans l'eau du milieu extérieur).



Appareil reproducteur mâle :

Il existe 9 testicules, 5 côté ovaire, 4 côté opposé. Ce nombre peut se réduire : l'un de nos exemplaires, entièrement normal par ailleurs, présente un seul testicule, du côté opposé à l'ovaire. D'autres présentent des testicules en nombre compris entre 2 et 8.

Le testicule le plus antérieur est situé immédiatement en arrière du niveau du bord postérieur de l'ovaire. Le testicule le plus postérieur est toujours situé en avant de la terminaison des cæcums. Les deux rangées de testicules sont franchement séparées; la rangée qui comprend quatre testicules est toujours située vers l'avant par rapport à l'autre; dans quelques cas, la rangée de 4 testicules est même entièrement en avant de la rangée de 5 testicules.

La forme des testicules est irrégulière, surtout chez les individus jeunes; elle tend à devenir plus ronde chez les individus âgés.

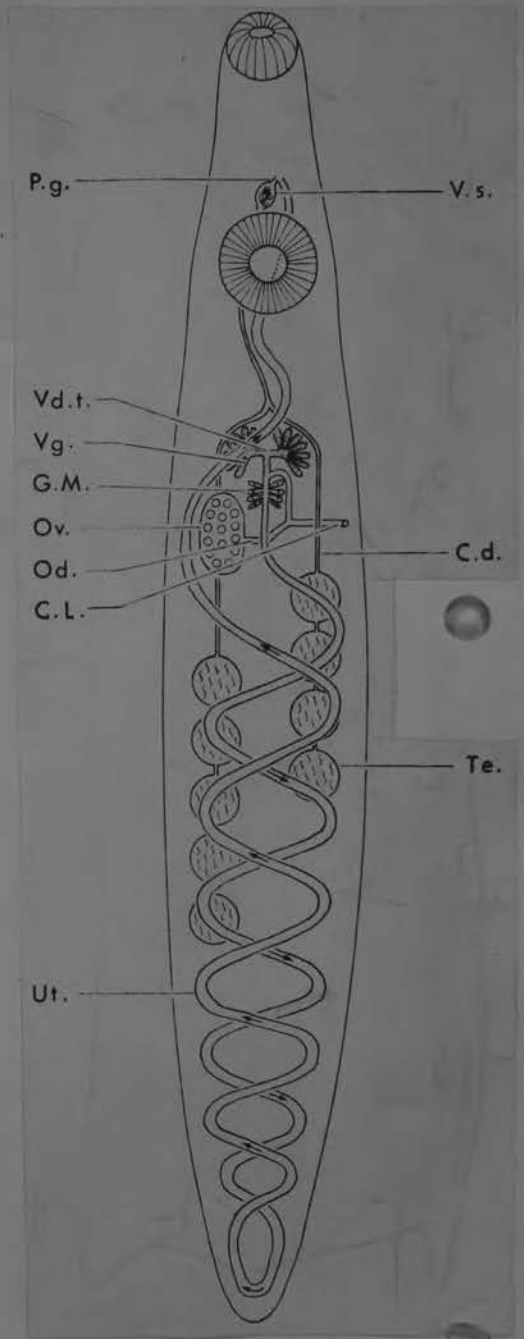
Chaque testicule mesure :

— diamètre transversal : 126 à 583 μ (303);
— diamètre antéro-postérieur : 137 à 514 μ (229).

Un canal déférent relie entre eux les testicules d'un même côté du corps. Les deux canaux se réunissent dans la région post-acetabulaire pour former un canal déférent commun qui se renfle en une vésicule séminale globuleuse située juste en avant de la ventouse ventrale. De cette vésicule s'échappe ventralement un canal très court qui aboutit au pore génital. Il n'y a pas d'appareil copulateur différencié.

Appareil excréteur :

La vessie est un tube sub-rectiligne, étroit, de section circulaire, s'étendant dorsalement depuis la région post-ovarienne jusqu'au pore excréteur; celui-ci est postérieur, sub-terminal dorsal. A l'avant, la vessie reçoit deux canaux collecteurs conformément au schéma donné pour le genre *Gorgodera* par Byrd, Nard et Reiber (1940).



Gorgodera (Gorgodera) japonica Yamaguti,1936

Host: Rana nigromaculata

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Gorgodera (*Postodera*) *loossi* (Ssinitzin, 1905)

Синонимы: *Distoma cygnoides* в понимании Looss, 1894, nec *D. cygnoides* Zeder, 1800; *Gorgodera cygnoides* (Zeder, 1800) в понимании Looss, 1899, 1901, 1902

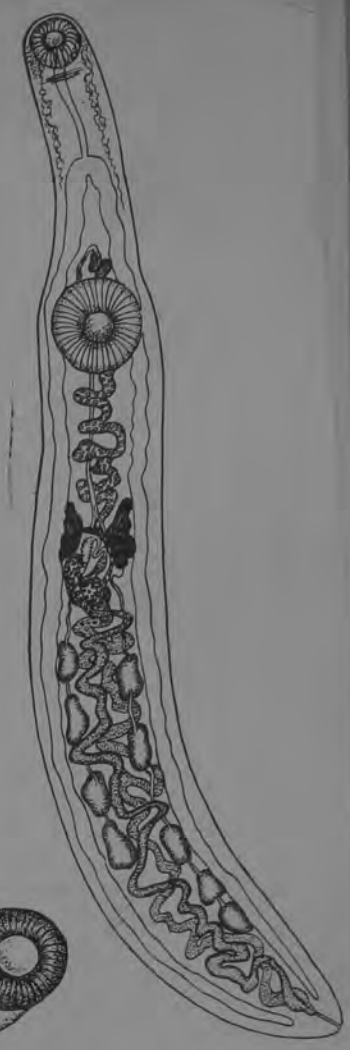
(Рис. 248, 249 и 250)

Хозяева: лягушки (*Rana esculenta*, *R. ridibunda* и *R. temporaria* (?) из сем. *Ranidae*).

Локализация: мочевой пузырь.

Места обнаружения: Германия, Польша (Варшава) и СССР (Киев).

Историческая справка. При исследовании паразитофауны лягушек окрестностей Варшавы Синицын (1905) описал три новых вида: *Gorgodera varsoviensis*, *G. pagenstecheri* и *G. loossi*. До Синицына в Европе был известен только один вид, описанный Цедером (1800) под именем *Dist. cygnoides*. Для этого вида Лоосс (1899) обосновал новый род *Gorgodera* с типом *G. cygnoides*. Ввиду того, что описание вида в работе Цедера было недостаточным, Лоосс воспользовался для характеристики типичного вида нового рода найденным им в 1894 г. паразитом у лягушки в Германии. Свою работу Лоосс иллюстрировал рисунком паразита. Однако при сравнении описания и рисунка *G. cygnoides* в работе Лоосса с описаниями прежних авторов, например Пагенштехера, приведенной в настоящей работе, нетрудно убедиться, что Лоосс имел дело с другим видом. Строение и расположение желточников и семенников у паразита, описанного Лооссом под именем *G. cygnoides*, совсем иное, чем у паразитов, описанных Цедером, Пагенштехером и др. Не заострив на этом внимания, Синицын воспользовался описанием и рисунком Лоосса для обоснования своего нового вида — *G loossi*. При этом Синицын не выделил лооссовского паразита в новый вид, оставив *G. cygnoides* как самостоятельную видовую единицу, но объединил их в своем



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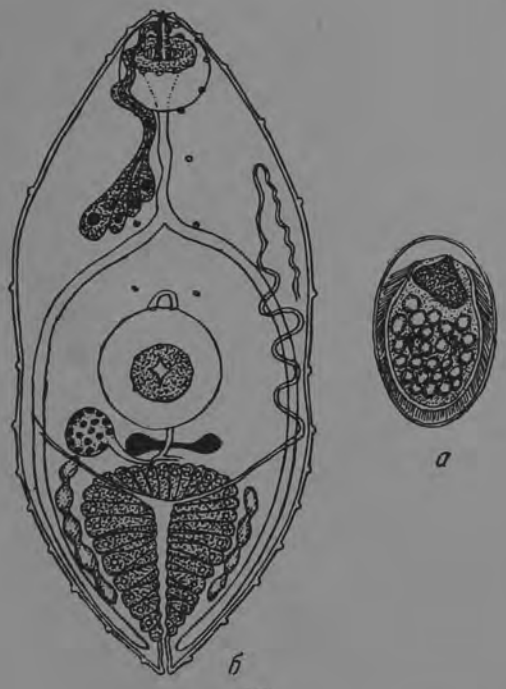

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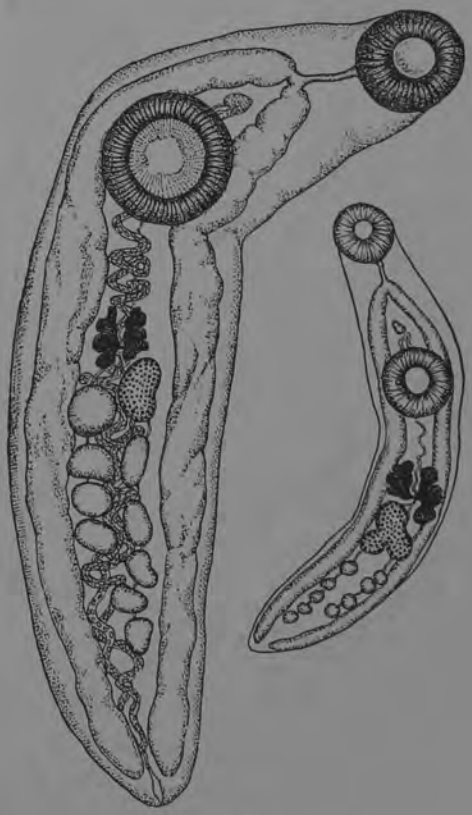

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Gorgodera (*Mediodera*) *media* Strom, 1940

(Рис. 242)

Хозяин: лягушка (*Rana ridibunda* из сем. *Ranidae*).
Локализация: мочевой пузырь.
Место обнаружения: СССР (Средняя Азия, г. Ош).
Описание вида (по Штрому, 1940). Форма тела паразита

242

Gorgodera (*Gorgodera*) *microovata* Fuhrmann, 1924

(Рис. 229)

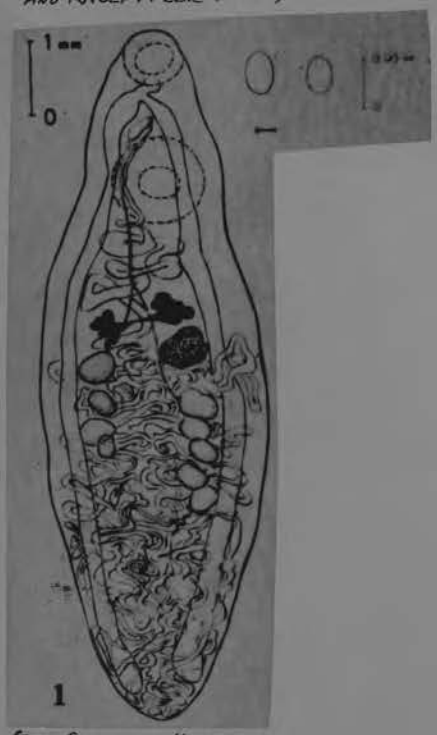
Хозяин: лягушка (*Rana esculenta*).

Локализация: мочевой пузырь.

Место обнаружения: Швейцария (Женева).

Описание вида (по Фурману, 1924). Форма тела паразита веретенообразная, сильно вытянутая, с суженными передним и задним концами и умеренно расширенной средней частью тела. В поперечном сечении тело овальное. Кутикула гладкая. Длина паразита 5—9 мм. Наибольшая ширина в средней части тела червя, на уровне передних семенников — 0,6 мм. Ротовая присоска овальная, размер ее наибольшего поперечного сечения 0,31—0,36 мм. Брюшная присоска круглая, выдается за край тела паразита, 0,60—0,75 мм в диаметре. Соотношение размеров ротовой и брюшной присосок 1 : 2. Пищевод длинный, довольно толстый, прямой, трубковидный, 0,18 мм длины, окружен циркулярной мускулатурой. Ветви кишечника простые, трубковидные, толстые в поперечном

REPORTED FROM BUFO BUFO GREDOSICOLA MÜLLER AND HELLMICH, 1935, AT HOYOS DEL ESPINO (SIERRA DE GREDOS - ESPAGNE) — COMBES AND KNOEPFFLER (1965)



FROM COMBES AND KNOEPFFLER (1965) — DORSAL VIEW

Gorgodera minima Cort,1912

GORGODERA MINIMA NOV. SP.

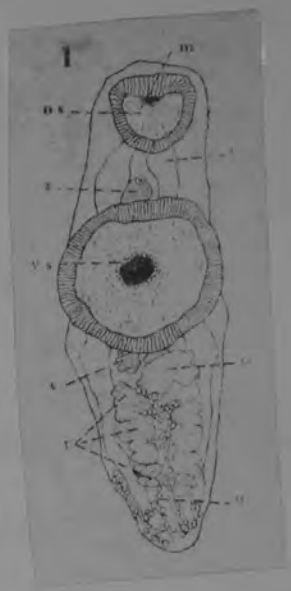
In the fall of 1910 I found in the bladder of a large specimen of the bull frog (*Rana catesbiana*) fifty very small trematodes (Fig. 1) which differed so greatly from all the known species that I have considered them to belong to a new species of the genus *Gorgodera*. In October of the following year, I obtained some further specimens (Fig. 2) of the same species, which had been collected from the leopard frog (*Rana pipiens*) at Bemidji, Minnesota, by Herman Douthitt. In the bull frog the wall of the bladder was thickly crowded with the minute worms, which were so tightly attached by the acetabulum, that it was necessary to tear the tissue of the bladder to shreds before they would loosen their hold. When killed in corrosive acetic by the shaking method of Looss the worms became somewhat contracted, and showed a tendency to bend backward at the acetabulum forming an angle of almost 90 degrees.

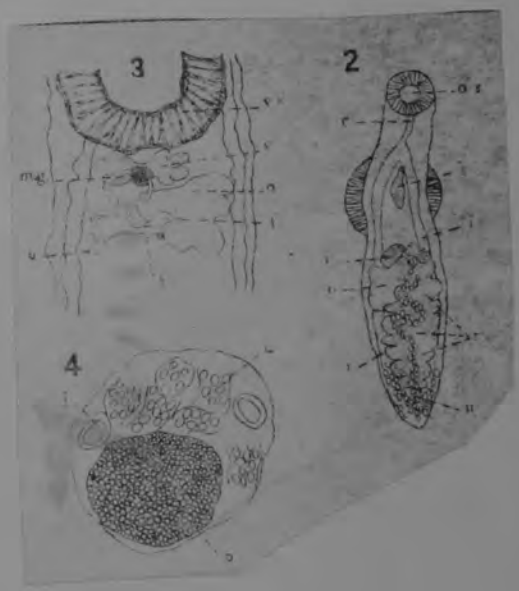
These distomes vary in length from 0.9 mm. to 1.58 mm. The smallest individuals have a considerable number of eggs in the posterior end, while the largest have the uterus crowded thruout its length. In a specimen measuring 1.58 mm. the internal organs were almost entirely obscured, and the posterior end assumed the character of a distended egg sac. The extremely small size of this species is very striking. In the genus *Gorgodera* the smallest previously described form is between 3 mm. and 5 mm. in length, and the others are all over 7 mm. I shall call this new species *Gorgodera minima*.

The ventral sucker divides the worm into two nearly equal parts (*vs*, Figs. 1 & 2), the anterior region being somewhat narrower and shorter than the posterior. Both regions are almost cylindrical, the posterior tapering slightly to a blunt point. In an individual crowded with eggs, a cross section thru the middle of the anterior end measured 0.27 mm. in width by 0.26 mm. in thickness (Fig. 8), one at the region of the ovary 0.37 mm. in width by 0.31 mm. in thickness (Fig. 10), and one thru the posterior testis 0.31 mm. by 0.27 mm. (Fig. 11).

The acetabulum in *Gorgodera minima* is very large as compared with the size of the worm and appears much as in the preceeding species. It is circular from ventral view, the average diameter for ten specimens being 0.39 mm. The oral sucker has a diameter of about 0.20 mm., making the ratio of the two a little less than 2:1.

The mouth appears as a slit-like transverse aperture toward the anterior part of the oral sucker (*m*, Fig. 1), opening ventrally and about one-fifth or one-sixth the width of the sucker. The esophagus is short and narrow, about 0.017 mm. in width and 0.12 mm. in length. The intestinal ceca are about 0.06 mm. in width and at the beginning of their course are dorsal, and wide apart to give room for the greatly developed vesicula seminalis. In the narrow portion of the animal just dorsal to the acetabulum the ceca come closer together, and just posterior to this structure they spread very widely to pass to the outside of the reproductive organs, which fill almost the entire width of the animal at this region. They continue backward outside of the reproductive organs almost to the posterior extremity of the body. They may be next to the outside wall or portions of the uterus may run to the outside of them.





The reproductive system of *Gorgodera minima* is very similar to that of *Gorgodera amplicava* and *Gorgodera cygnoides*. The chief differences are in the relative size of the parts and in the distances between them, which to some extent at least are determined by the size and shape of the animal. The testes are nine in number, five on the same side as the ovary and four on the opposite side (Fig. 1). They are in shape rectangular prisms crowded very closely together. All the testes seem to be about the same size and the average measurements for a single testis are 0.05 mm. longitudinally, 0.08 mm. laterally, and 0.24 mm. dorsoventrally (Fig. 11). This peculiar shape is an important distinguishing feature of the species. One might compare the testes to two series of cigar boxes attached by strings thru their centers and arranged four on one side and five on the other, with the strings from each lateral series connecting further forward. The testes themselves are somewhat irregular in outline, slightly lobed, and connected by a series of short tubules. From the middle of the anterior surfaces of the anterior testes on each side run forward the vasa efferentia. These tubules unite in front of the ovary and the yolk glands into the vas deferens, which passes dorsal to the acetabulum into the vesicula seminalis, a large pyriform sac following a slightly spiral course and filled with sperms (*s*, Fig. 1). In a worm 0.9 mm. long this organ measured 0.14 mm. in length, and in a cross section of another worm, 0.30 mm. in width and 0.26 mm. in thickness, it measured 0.99 mm. in width by 0.11 mm. in thickness (Fig. 8). These measurements are of course somewhat modified by the state of contraction, but are given to show the relatively large size of the seminal vesicle in this species. From the anterior end of the seminal vesicle the ejaculatory duct curves down, and opens ventrally at the common genital pore. This duct is quite long in *Gorgodera minima* and widens out before opening into the pore into a small chamber lined with rather tall epithelial cells among which are heavily staining club-shaped cells, which appear to be glandular. Around the first part of the ejaculatory duct are grouped the prostate glands (*p*, Fig. 6).

The vitellaria in *Gorgodera minima* are composed of two groups of nine to eleven follicles each, lying one to each side of the animal just back of the acetabulum. They are connected by a transverse vitelline duct which opens into a common vitelline reservoir. On the left side immediately behind these glands, and often overlapping them ventrally is the ovary which is irregular and slightly lobed, and has a thickness almost equal to the thickness of the worm (Fig. 4). In a cross section thru the middle of the ovary, 0.28 mm. wide by 0.20 mm. thick, this organ had a width of 0.12 mm. and a thickness of 0.20 mm. (Fig. 10). It lies toward the ventral surface and is widest toward this side. In a frontal section 1.1 mm. long by 0.28 mm. wide, the ovary measured 0.1 mm. with the length of the animal and 0.15 mm. with its width. None of my specimens showed sexual amphitypy, in all of them the ovary being to the left. The oviduct leaves the dorsal surface of the ovary, widens immediately into the fertilization space, and narrowing again, passes forward still near the dorsal surface to change into the ootype within Mehlis' gland. This is a small group of unicellular gland cells, which lie dorsally between the groups of follicles of the vitelline glands. Within Mehlis' gland the median duct from the vitellaria opens into the ootype. Laurer's canal opens from the oviduct about half way between the fertilization space and the ootype. From its junction with the oviduct, this duct which is very narrow, passes ventrad and then doubles back to open on the dorsal surface back of the ovary (Fig.

31). As with the testes the longest axes of the vitellaria and ovary are with the thickness of the animal.

From the ootype the uterus goes to the side opposite the ovary and folds down the region outside of the testes to the posterior extremity of the body, where it fill with its coils the region back of the intestinal ceca and testes. From this region it winds forward on the opposite side, filling not only the region between the groups of testes, but also all the available space between the testes and body wall and even between the individual testes. In front of the testes it emerges from this mass of coils, to pass to the ventral side of the ovary, over the acetabulum and forward ventral to the vesicula seminalis to the genital pore (Fig. 4). In such a uterus as the one described above the whole course is distended with eggs. In younger worms where fewer eggs are present there is less complication. In general the course of the uterus is down the side opposite the ovary and up the other side to the genital pore filling all the available space between the organs.

The eggs in *Gorgodera minima* increase in size as they develop in the uterus from the ootype to the gential pore. In preserved specimens the eggs average in size at the ootype about 0.021 mm. by 0.014 mm., in the coils of the posterior end 0.024 mm. by 0.017 mm., and just behind the genital pore, where they contain fully developed embryos, 0.032 mm. by 0.022 mm. Looss (1894:63) notes similar differences in size in the eggs of *Distomum cygnoides*. I have no measurements of eggs from living animals. As noted by Stafford (1902:418) in *Gorgoderina simplex* and observed by me in *Gorgoderina attenuata* eggs of the type found in this group shrink considerably after preservation in alcohol. Therefore in this species also comparisons should not be made between living and preserved eggs.

Gorgodera minima is the second American species of the genus *Gorgodera*, the other species being *Gorgodera amplicava*, described by Bensley (1897). The most striking differences between these two species are in the size and shape of the animals, the ratio in size of the suckers, and in the shape and relations of the reproductive organs. *Gorgodera minima* is a very small worm, 1 to 2 mm. in length, with the anterior and the posterior regions of almost equal size and almost cylindrical, while *Gorgodera amplicava* is much longer, 3 to 5 mm., considerably wider, with the posterior body flattened and pointed much like the blade of a two edged knife. The anterior region in this worm is also very small in proportion to the posterior, being about one-third as long and not one-fourth as wide, altho thicker. In *Gorgodera amplicava* the acetabulum is not only twice as large as in *Gorgodera minima*, but is from two and one-half to three times as large as the oral sucker, while in the later species the ratio is less than two to one. The great relative thickness of the testes and ovary in *Gorgodera minima* is another feature which differentiates it from *Gorgodera amplicava*. The seminal vesicle is relatively much larger in the former than in the latter species. The European species of *Gorgodera* are larger than the American, all being over 7 mm. in length. *Gorgodera minima* is by far the smallest representative of the genus *Gorgodera* yet reported.

In order to facilitate comparison there is given here a list of the genera and species of frog bladder flukes, a table of the hosts and localities of the forms reported from North America, and a key for the identification of North American species.

Of frog bladder flukes there have been described two genera and ten species:

GORGODERA

Gorgodera Pagenstecheri Stiles

Gorgodera Loossi Stiles

Gorgodera Varsoviensis Stiles

Gorgodera Amplicava Looss

Gorgodera minima Cort

GORGODERINA

Gorgoderina simplex Looss

Syn. *Gorgoderina opaca* Stafford

Gorgoderina vitellilobum Oleson

Gorgoderina translucida Stafford

Gorgoderina attenuata Stafford.

Gorgodera (*Mediodera*) *pagenstecheri* Ssinitzin, 1905
(Рис. 237)

Хозяева: лягушки (*Rana esculenta* и *Rana ridibunda*)

Локализация: мочевой пузырь.

Места обнаружения: Польша, СССР (Киев, Саратов, Астрахань, Московская область, Муром, Ростовская область, Кавказ, Сочи, Сухуми, Средняя Азия, Куляб).

Историческая справка. В мочевом пузыре лягушки Синицын (1905) обнаружил паразита, которого выделил в новый вид и присвоил ему наименование *Gorgodera pagenstecheri*. При этом он дал описание строения церкария и процесса маритогонии, но не привел подробной характеристики взрослых форм. По мнению Синицына, единственным фактором, послужившим к выделению *Gorgodera pagenstecheri* в новый вид, являлась биология паразита, тогда как взрослый половозрелый червь «очень напоминает *G. loossi* и разнится только тем, что яичник его всегда лопастной, желточник — глубокораздельный» (Синицын, 1905). Полагая, что взрослая половозрелая форма *Gorgodera pagenstecheri* сходна с таковой же *Gorgodera loossi* и *G. cygnoides*, Синицын привел лишь размеры яиц. Совершенно очевидно, что отсутствие четкого описания нового вида ставило в затруднительное положение тех исследователей, которые находили только взрослых половозрелых паразитов *Gorgodera pagenstecheri*. Положение это как будто бы еще более усугубилось благодаря описанию ряда новых, близких к *Gorgodera pagenstecheri*, видов Фурманом (1924) в Швейцарии, Штромом (1940) и Пигулевским (1945) в Средней Азии. Но вместе с тем работы вышеназванных авторов дали возможность подметить те особенности строения *Gorgodera pagenstecheri*, на которые до этого не обращалось внимания. Обоснование своего вида Синицын начал с описания найденной у моллюска в том же водоеме, откуда была получена и зараженная лягушка, церкария, у которого, по его данным, имелось только два семенника. Процесс маритогонии, описанный Синицыным, имеет большое значение для распознавания данного вида паразита. Характерным для *Gorgodera pagenstecheri*, но вовсе не обязательным и закономерным фактором для всех видов этого подрода, является значительное запаздывание в разделении семенников у некоторых особей. В результате встречаются паразиты с развитой маткой и только с шестью (или меньше) семенниками. Однако, как показали исследования Пигулевского, даже у очень молодых червей этого и других видов с неразвитой маткой нередко наблюдаются все девять семенников, получившиеся путем одновременной перетяжки. Благодаря этому обе группы семенников имеют четковидную форму. Таким образом, наряду с обычными трематодами с девятью семенниками можно найти и таких, у которых всего семь, шесть или даже пять семенников. Подобного паразита с семью семенниками и нашел Фурман (1924). Значительно позже Штромом (1940) и Пигулевским (1945) были найдены в Средней Азии паразиты, описанные под именем *Gorgodera media* Strom и *Gorgodera asiatica* Pigulevsky. Характерным для них являлось расположение семенников почти на равном расстоянии от брюшной присоски и заднего конца тела червя. Нами было собрано большое количество экземпляров горгодер у лягушек в окрестностях Саратова, по течению р. Сыр-Дарьи в Средней Азии и в Грузии. Были просмотрены препараты горгодер, собранные М. Н. Дубининой в окрестностях Астрахани (заповедник в дельте р. Волги), а также собранные Ю. А. Филипченко в окрестностях Сочи и переданные нам для изучения

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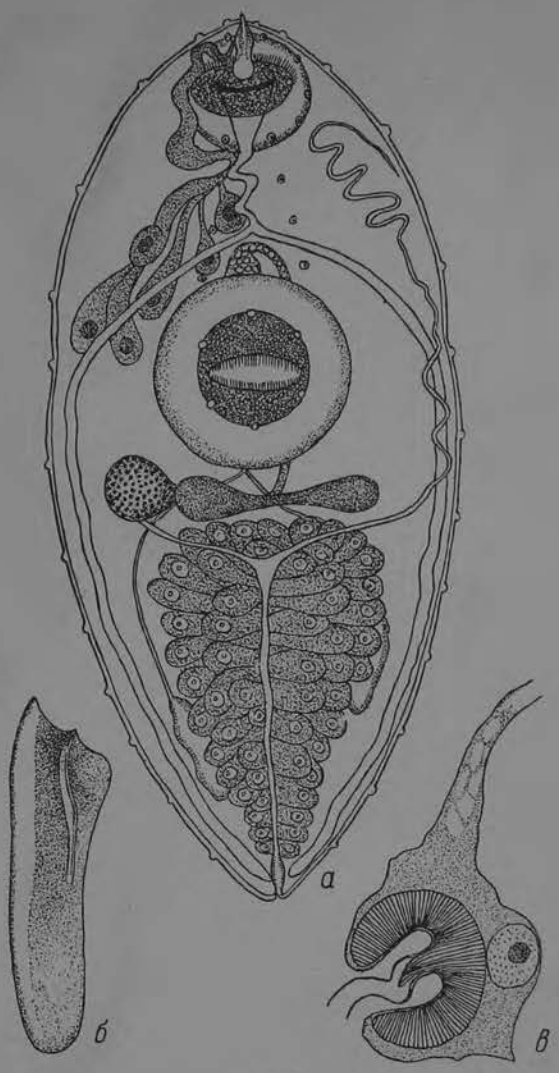


238. *Gorgodera* (*Mediodera*) *pagenstecheri* Ssinitzin, 1905
(по Синицыну, 1905)

а — церкарий; *б* — стилет; *в* — пламеневидная клетка

Gorgodera (*Mediodera*) *pawlowskyi* Pigulevsky[1], 1952

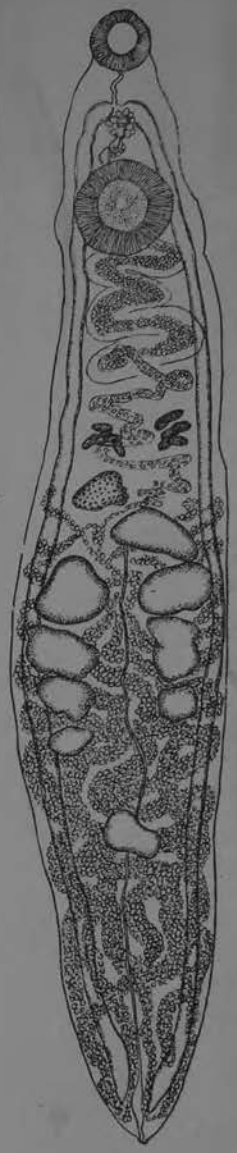
(Рис. 243)

Хозяин: лягушка (*Rana* sp. из сем. *Ranidae*).

Локализация: мочевой пузырь.

Место обнаружения: СССР (Черноморское побережье Кавказа, Сочи).

Описание вида. Форма тела паразита веретенообразная, с суженными передним и задним концами и умеренно расширенной средней частью тела. Кутикула гладкая. Длина паразита 10,04 мм; наибольшая ширина в области передних семенников 2,35 мм. Ротовая присоска



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Gorgoderidae

Gorgodera unexpecta Chin, 1963

1. *Gorgodera* (*Extremodera*) *unexpecta* sp. nov. was collected from the urinary bladder of *Rana nigromaculata*. It belongs to the subgenus *Extremodera* Pigulevsky, 1952 which contains only one species, *G.* (*E.*) *australiensis* Johnston, 1912. Our new species is readily distinguishable from the latter species by the absence of spines or tubercles on the body surface, the presence of scales on the anterior part of the body, the more anteriad located ventral sucker, and the larger size of the ovary, as compared with the testes which is conspicuously lobed.

Author: Chin Tai-ching

Body 4.5 to 6.1 by 0.97 to 1.57 mm
Eggs 37 to 42 by 51 to 56 μ
Host RANA NIGROMACULATA, URINARY BLADDER
Loc. KWEIYANG, CHINA

图 2 *Gorgodera* (*Extremodera*) *unexpecta* sp. nov., 未成熟标本，腹面观

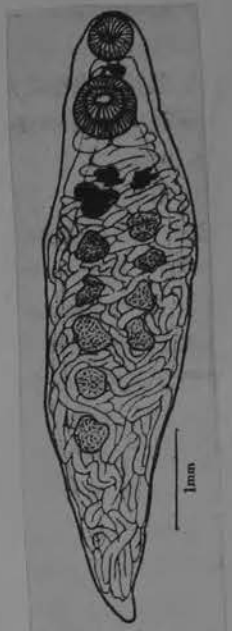


图 1 *Gorgodera* (*Extremodera*) *unexpecta*

Gorgodera (Postodera) varsoviensis Ssinitzin, 1905

(Рис. 244, 245 и 246)

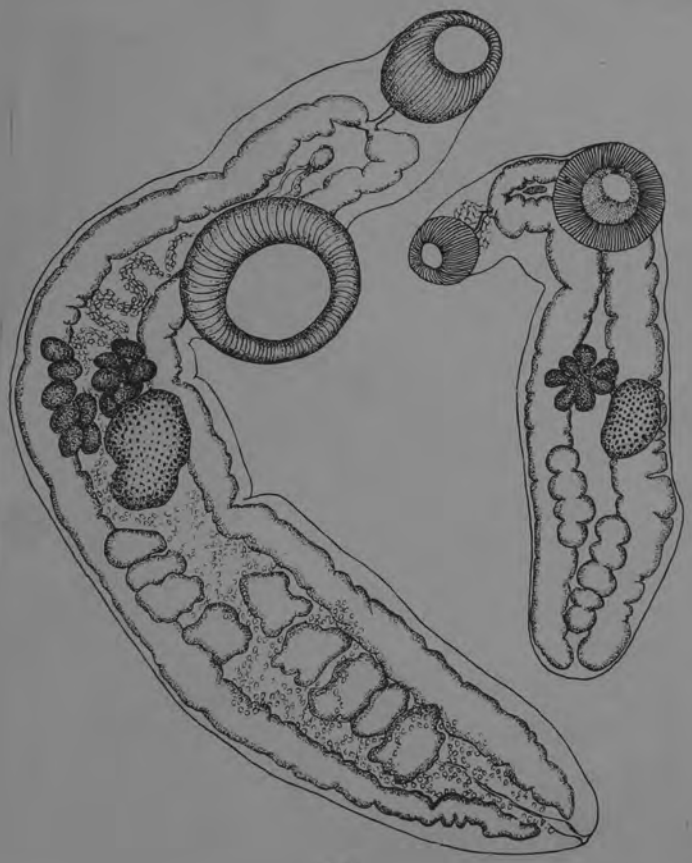
Хозяева: лягушки (*Rana esculenta*, *R. ridibunda*, *R. terrestris*, *R. temporaria* из сем. *Ranidae*).

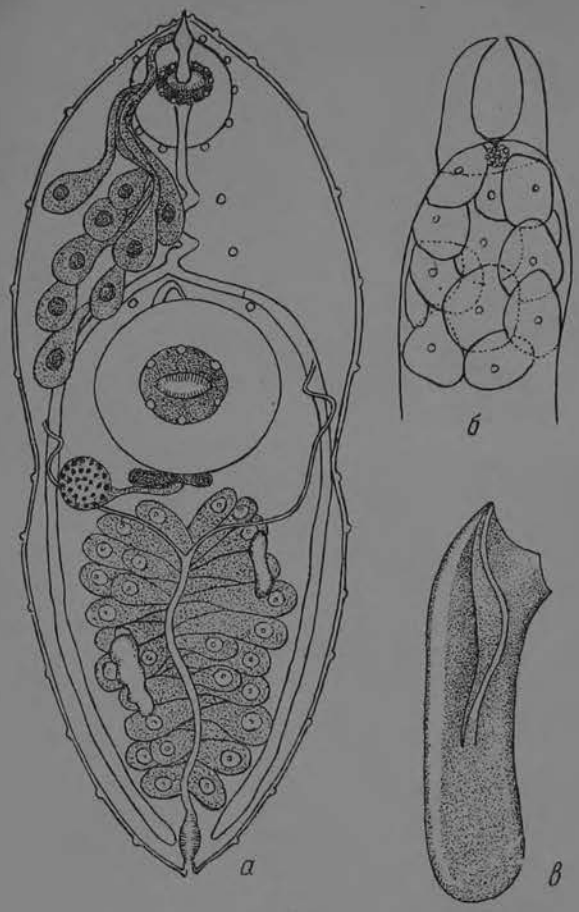
Локализация: мочевой пузырь.

Место обнаружения: Польша (Варшава), СССР (Киев, Черноморское побережье Кавказа, Нижнее Поволжье), Африка (Тунис).

Описание вида (по Пигулевскому). Форма тела паразита веретенообразная, в поперечном разрезе — овальная. Способность к сокращению сильная. Кутикула гладкая. Паразит достигает 6,0—8,0 мм. Более крупные экземпляры — 9,0 мм — встречаются редко. Наибольшая ширина достигает 1 мм, реже 1,5—1,9 мм. Ротовая присоска овальная или округлой формы, 0,50—0,54 × 0,54—0,65 мм. Брюшная присоска также большей частью овальной формы в $1^1/_2$—2 и даже в $2^1/_2$ раза превышает размер ротовой присоски и иногда несколько выдается за края тела червя. Размер брюшной присоски в среднем 0,76—0,85 × 0,87—1,98 мм. Пищевод короткий, трубковидный, прямой, 0,08—0,22 мм длины.

[1] Публикуется впервые.





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246. *Gorgodera* (*Postodera*) *varsoviensis* Ssinitzin, 1905 (по Синицыну, 1905)
а — церкарий; *б* — передний конец хвоста церкария; *в* — стилет церкария

GORGODERA VARSOVIENSIS SINITZINE, 1905.

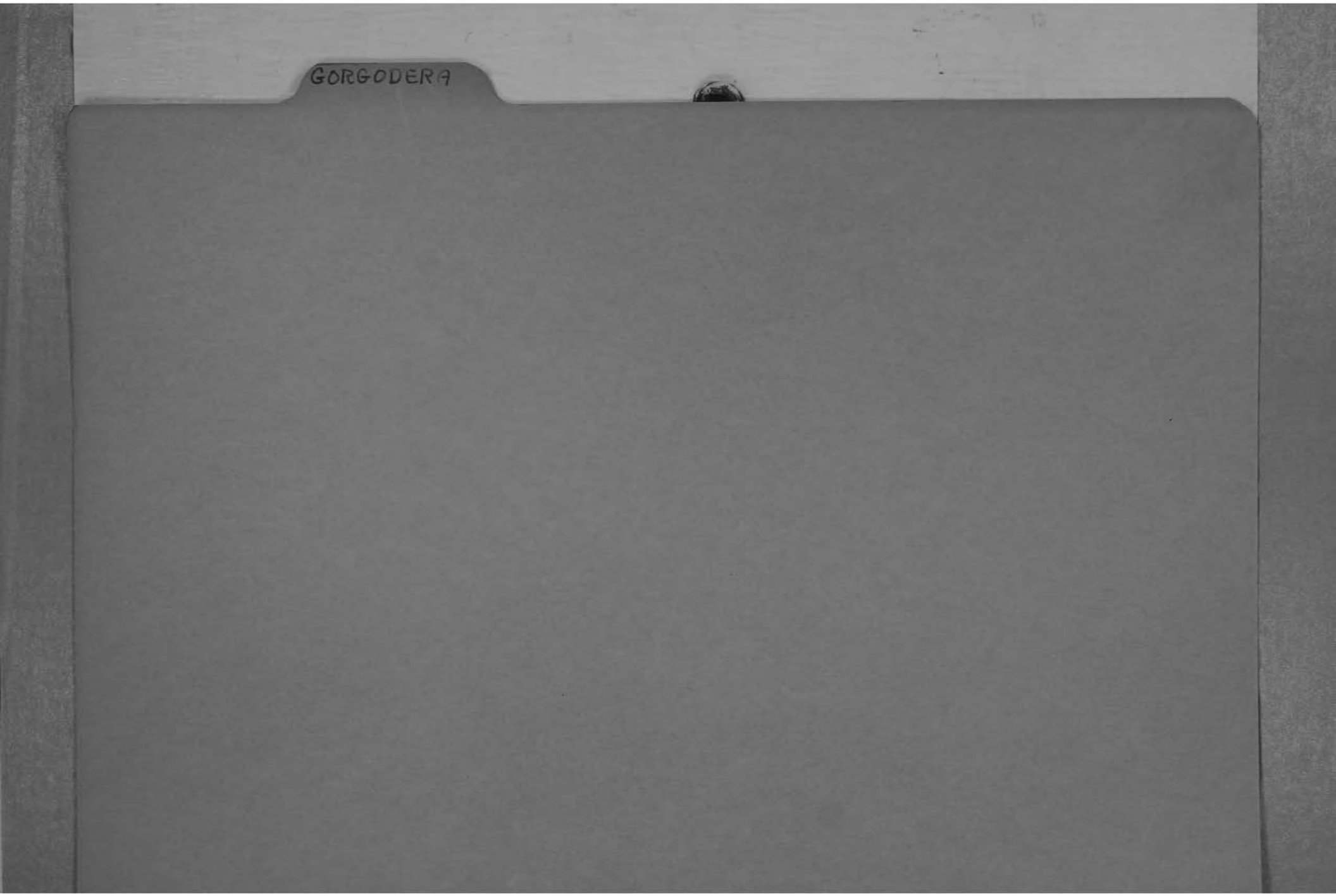
Nous avons trouvé deux exemplaires de ce trématode dans la vessie de *Rana ridibunda* de l'oued Bezirk (Cap Bon) le 31 octobre.

Ils sont longs de 5 mm. pour une largeur de 1 à 1,2 mm. La ventouse orale mesure 0,48 mm. et l'acétabulum 0,8 mm. de diamètre. Les vitellogènes sont formés de lobes presque séparés et au nombre de trois ou quatre de part et d'autre du corps. L'ovaire est irrégulier. La partie postérieure du corps est remplie par un utérus sinueux qui contient des œufs de 0,035 sur 0,025 mm.

Sur un des exemplaires, à cause des nombreux œufs, les testicules ne sont pas visibles. Sur l'autre on en compte quatre d'un côté et de l'autre cinq plus petits et plus allongés transversalement.

Nous croyons pouvoir rapporter ces distomes à l'espèce de Sinitzine *G. varsoviensis*. Joyeux qui n'avait eu de la même localité que des exemplaires immatures avait déjà, avec réserve, fait cette détermination.

from Baluzet and Callot, 1938


GORGODERA

Amazonadistoma ~~n. gen.~~ THATCHER, 1979

Diagnose genérica: Gorgoderidae; Phyllodistominae; com as características da Família e Subfamília. Corpo cilíndrico e atenuando-se anteriormente, alargado, arredondado e pouco achatado posteriormente. Cutícula sem espinhos. Parede do corpo com corrugações musculosas, laterais, na porção posterior. Ventosa oral grande, subterminal. Faringe ausente. Esôfago bifurcado próximo da margem posterior da ventosa oral. Cecos compridos; com divertículos e microvilosidades. Acetábulo grande, pré-equatorial. Testículos simétricos ou diagonais; pós-equatoriais. Vesícula seminal pequena, sinuosa. Poro genital mediano; entre as duas ventosas. Ventosa genital presente. Ovário lateral à linha mediana; pré-testicular. Glândulas vitelínicas de duas massas simétricas; pré-testiculares. Receptáculo seminal ausente. Glândula de Mehlis dorsal às glândulas vitelínicas. Canal de Laurer presente. Útero sinuoso, com alças inter e extracecais. Ovos pequenos, numerosos. Vesícula excretora tubular, comprida. Parasitas intestinais de peixes de água doce.

Espécie tipo: **A. negrensis** n. sp.

Discussão

O *Amazonadistoma* n. gen. é provisoriamente incluído na Subfamília Phillodistominae por ter a maioria das características daquele grupo. O novo gênero difere dos demais gêneros da Subfamília por ter um corpo robusto, cecos com divertículos e o intestino como habitat.

O *Amazonadistoma* n. gen. parece-se mais com o gênero *Phyllodistomum* do qual se distingue pelos seguintes caracteres: 1) corpo grosso e não petaliforme, 2) corrugações laterais na parte posterior do corpo, 3) cecos com divertículos, 4) útero estendendo-se extracecalmente, 5) vesícula seminal sinuosa (e não sacular) e 6) habitat no intestino do hospedeiro (e não na bexiga urinária).

A cor preta destes trematódeos parece ter sido o resultado de uma infecção com algum micro-organismo. Podiam observar-se grupos de fibras escuras por todo o corpo dos trematódeos, mas estas fibras não se encontravam dentro dos órgãos e ventosas, nem na cutícula. Presumivelmente, o organismo invasor representa uma espécie de fungo, mas pre-

cisa-se de estudos adicionais para comprovar esta hipótese. Até o momento, não foi encontrado nenhum exemplar de *A. negrensis* sem infecção.

Nos cortes, foi possível observar que o epitélio cecal está provido de microvilosidades, semelhantes às estruturas citadas recentemente no Brasil por Padilha (1978) na Família primitiva, Zonocotylidae (Paramphistomoidea). A presença de microvilosidades no trato digestivo de um trematódeo indica que o sistema está funcional e que o helminto realmente ingere e digere algum alimento. Um sistema digestivo funcional num parasita deve ser considerado como uma característica primitiva, isto é que se encontra pouco modificado ou adaptado para a vida parasítica. O habitat (bexiga urinária ou intestino) dos Gorgoderidae também indica um grupo pouco evoluído para o parasitismo.

Etimologia

O nome genérico quer dizer "trematódeo com duas ventosas da Amazônia", e o nome específico refere-se à cor preta do helminto.

Amazonadistoma negrensis ~~n. sp.~~ THATCHER, 1979

(Fig. 1 & 2)

Hospedeiro : **Gymnorhamphichthys hypostomus** Ellis (Gymnotoidea : Rhamphichthyidae) "sarapó-de-bico".

Habitat : Intestino.

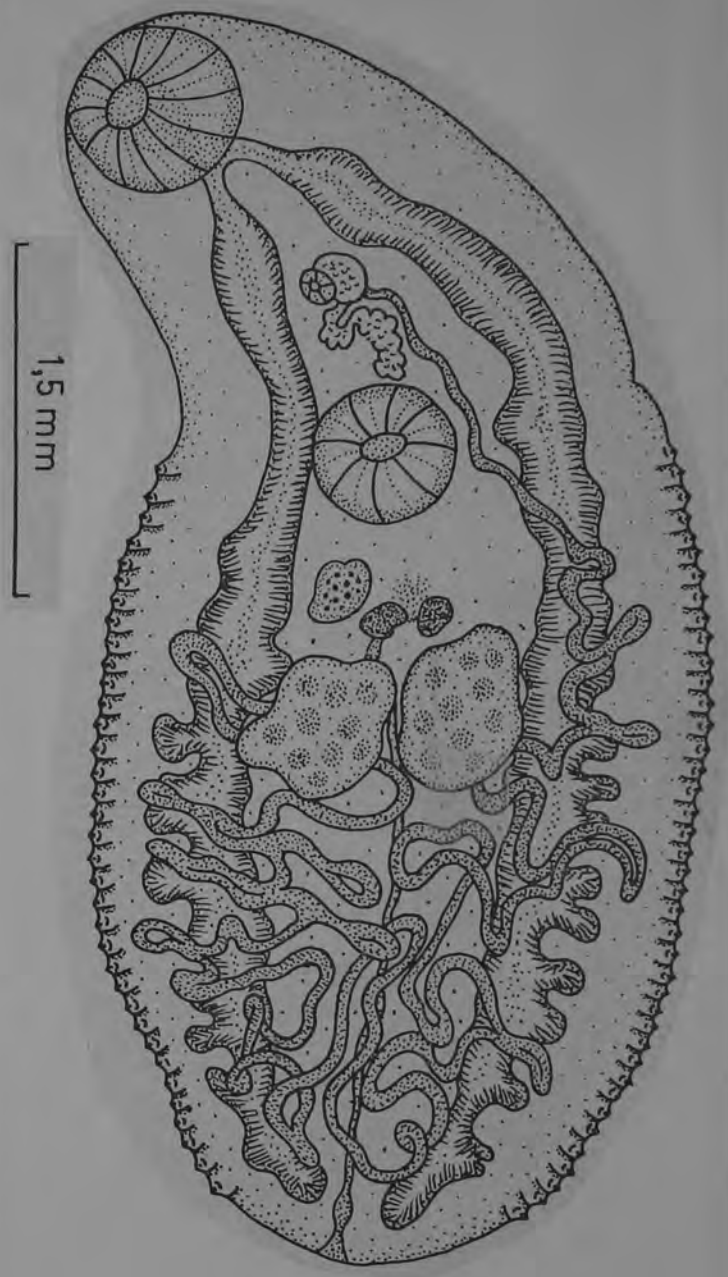
Intensidade : Até 15 helmintos por hospedeiro.

Procedência : Lago Janauacá, Manaus, Amazonas Brasil.

Holótipo : Instituto Nacional de Pesquisas da Amazônia (INPA).

Parátipos : INPA e Museu de Zoologia da Universidade de São Paulo.

Diagnose específica (baseada em 8 exemplares) : Com as características do gênero. Corpo com 5,3-6,3 (5,7) de comprimento e 2,2-2,6 (2,4) de largura. Cutícula sem espinhos, mas com corrugações laterais na porção posterior, estendendo do nível do acetábulo até próximo à extremidade posterior. Ventosa oral mede 0,66-0,76 (0,71) de diâmetro. Boca em forma de funil. Faringe ausente, mas paredes do esôfago musculosas. Esôfago curto, bifurcando cerca da ventosa oral. Cecos chegando até próximo à extremidade posterior do corpo; com divertículos e microvilosidades. Acetábulo com 0,52-0,59 (0,55) de diâmetro. Testículos simétricos, ou ligeiramente diagonais; fracamente lobados; medem 0,52-0,89 (0,64) de diâmetro. Bolsa do cirro ausente. Vesícula seminal sinuosa. Poro genital mediano, entre as ventosas. Ventosa genital presente. Ovário fracamente lobado; entre os testículos e o acetábulo; no lado direito, ou no esquerdo da linha mediana; mede 0,18-0,36 (0,27) de diâmetro. Glândulas vitelínicas fracamente lobadas; situadas lado a lado; pré-testiculares; medem 0,12-0,26 (0,19) de diâmetro. Útero delgado, sinuoso; com alças inter e extracecais na região posterior do corpo. Ovos medem 23 x 30 micra. Vesícula excretora longa e tubular; passando anteriormente entre os testículos.



ponta lateral da margem do corpo.

AMAZONA DISTOMA

Gorgoderidae

Sub-family Anaporrhutinae Looss 1921

Medium to large Gorgoderidae with the posterior part of the body distinctly broad. Muscular pharynx present and usually connected with a short esophagus. The terminal part of the genital tract is strongly developed. The vesicula seminalis is long and coiled. The ejaculatory duct and the metraterm (terminal part of the uterus) is elongated. Female genital organs without Laurer's canal but with a strongly developed receptaculum seminis. Testes may be internal or external to the intestinal ceca. Vitelline glands apart from each other.

Genera: Anaporrhutum Ofenheim 1900
Probolitrema Looss 1901
Plesiochorus Looss 1901
Petalodistomum Johnston 1912
Staphylorchis Travassos 1920

Dendrorchis Travassos is a synonym of Phyllodistomum

ANAPORRHUTUM v.Ofenheim 1900

Large Anaporrhutinae with definitely braadened posterior ### part of the body. A strong muscular pharynx is present; intestinal ceca not branched. The testes are divided into a large number of spherical bodies which are partly internal and partly extennal to the intestinal ceca. Vitelline glands are ventral and internal to the intestinal ceca. A large seminal receptacle present. In the pericardium and body cavity of Elasmobranch fishes. Type species: A. albidium v.Ofenheim 1900

above from Nagaty 1930.

Discussion from Markell (1953) J. Parasitol.

DISCUSSION

The establishment of the family GORGODERIDAE (Looss, 1902) was a part of the monumental revision of the genus "*Distomum*" undertaken by Artur Looss and others at the turn of the century. In 1899 Looss stated that this genus corresponded in reality to a family, and accordingly set up several subfamilies including the Gorgoderinae. In 1900 Von Ostheim proposed the generic name *Anaporrhutum* for two forms, *Distomum albidum* Brandes from the pericardium and coelome

cavity of the ray *Aetobatis narinari*, and *D. richiardii* Lopez from the coelom of the shark *Scyllium*. These two species, with a worm from the rectum and urinary bladder of sea turtles which Braun (1899) had redescribed as *Phyllodistomum cymbiforme*, Looss (1901) placed in a new subfamily, the ANAPORRHUTINAE. In the same paper he pointed out that *P. cymbiforme* differed in certain fundamental respects from other phyllodistomes described by Braun, and renamed it *Plesiochorus cymbiforme*. The close relationship between GORGODERINAE and ANAPORRHUTINAE was recognized by Looss, who in 1902 proposed the inclusion of the two groups in a separate family, the GORGODERIDAE. The subfamilies are readily distinguished. The GORGODERINAE exhibit neither pharynx nor seminal receptacle, while these structures are always found in the ANAPORRHUTINAE. Laurer's canal is characteristic of the GORGODERINAE, but not the ANAPORRHUTINAE. The various genera of anaporrhutinae trematodes are figured diagrammatically in Plate 2. For the sake of clarity the uterus has been omitted in each drawing.

Anaporrhutum was broken down into two genera by Looss (1902). *A. albidum*, designated in 1901 as the type species of the genus, has subdivided testes, partly intracaecal and partly extracaecal in position, from which vasa efferentia arise, to be united below the ovary by a cross-connecting tubule before running separately to the seminal vesicle anterior to the ventral sucker. In *A. richiardii* the divided testes are entirely extracaecal, and their vasa efferentia have no cross-connections, but run straight to the seminal vesicle. Accordingly, a new genus *Probolitrema* was suggested for the species *P. richiardii*.

Two species belonging to a new genus, *Petalodistomum*, were described by S. J. Johnston (1913). Both were found in the coelom of the ray *Dasyatis kuhlii*. The type species, *P. polycladum*, is characterized by slightly branched intestinal caeca and excretory bladder and highly lobulated extracaecal testes which may be single or divided into as many as three separate masses. The second species, *P. cymatodes*, which Johnston described, differs from the first in that the testes consist of many minute follicles arranged extracaecally in a linear manner with short ducts leading directly to the vasa efferentia. The intestinal caeca are undulating but unbranched. Travassos (1922) proposed that the latter worm be given the generic name *Staphylorchis*. The only other genus of anaporrhutine flukes which has been described to date is *Nagmia*.

As mentioned above, T. H. Johnston (1934) rejected *Nagmia* as a synonym of *Petalodistomum*. Nagaty stated that *Nagmia* differs from *Petalodistomum*, to which it is most closely related, by its greater size, in the shape and relative position of the vitelline glands, and in the greater lobulation of the testes. Size certainly cannot be considered of any significance as a generic character, as Johnston rightly points out. Nagaty seems to have been in error regarding the structure of the vitelline glands in *Petalodistomum*, which he stated consists of "two sets of small rounded follicles". Johnston figured the type specimen of *P. polycladum* (see Pl. 2), with two quite compact masses, each of which "has about forty or fifty small rounded projections". He characterized these as "short tubular processes". Nagaty in his description of the vitellaria of *N. yorkei* stated that "Each gland is composed of many tubules, numbering from about twenty to thirty; from four to ten of these unite together and form a main stem. Three or four such stems are formed in all and these unite together". The same situation obtains in *N. floridensis*, although some of the "main stems" are composed of but one or two elongated tubules. As will be seen later,

another species of *Nagmia*, *N. pacifica*, may show some intergradation between the compact form of *Petalodistomum* and the looser [illegible] typical of *N. yorkei*. The difference in position of the vitellaria in the two genera is probably not of generic significance, but in *Petalodistomum* the vitellaria are very close to the ovary and seminal receptacle, and may underlie parts of these organs, while in Nagaty's figure of *N. yorkei* the right vitellarium, and in *N. floridensis* and *N. pacifica* both vitellaria are well lateral in position, with long ducts to the reservoir.

Nagaty's characterization of the structure of the testes in *Nagmia* is perhaps unfortunate, in indicating that they differ from those of *Petalodistomum* only by virtue of more extreme lobulation. This is not actually the case in *P. polycladum*, as it possesses from one to three large testis masses, connecting directly by short ducts to the vasa efferentia. In *N. yorkei* there are from twenty-nine to thirty-five separate follicles in each testis, and in *N. floridensis* eighteen and thirty, which are connected to the vas efferens by three orders of ducts. This is not deeper lobulation, but actual separation of the testis into many discrete parts, analogous to that seen in *Probolitrema*, *Anaporrhutum* and *Staphylorchis*, and in the subfamily GORGODERINAE, in *Gorgodera*. In all these cases such separation is considered to be of generic significance.

In the nomenclature of the male ducts, both Nagaty and Johnston, as well as Stunkard (1935) and Woolcock (1935) with *Probolitrema*, consider the vasa efferentia to be those ducts which join the testis follicles together; the main ducts from the testes which come together near the midline anteriorly, they call vasa deferentia. In all forms with compact testes, these two ducts would be considered vasa efferentia, and the common tubule formed by their junction the vas deferens. It seems best so to consider them, and to designate the tubules connecting the follicles as primary, secondary and tertiary connecting tubules. The vas deferens, then, extending medially from the junction of the two vasa efferentia, is expanded anteriorly into a seminal vesicle and pars prostatica.

In 1945 Caballero described as *Petalodistomum pacificum* a worm from the coelom of a shark (species undetermined) from Mexican Pacific waters. Caballero reviewed Nagaty's work and, in agreement with Johnston, considered *Nagmia* to be a synonym of *Petalodistomum*. Caballero's drawing shows that his species possesses loosely branching digitiform vitelline glands, and lobate follicular testes, united by a complex duct system. In a personal communication, Caballero states that the vitellaria actually range in structure from the very loose form which he figured to a compact structure such as described for *Petalodistomum polycladum*. In the above discussion I have considered Caballero's species as congeneric with *Nagmia yorkei* and *N. floridensis;* its name thus becomes *Nagmia pacifica* (Caballero).

Nagmia yorkei is the only anaporrhutine described from elasmobranchs which has been found in any site other than the body cavity. Nagaty's specimens were "found in a bottle which also contained a number of cestodes," and it is possible that the original collector (Yamaguti) was in error regarding their site of origin in the host.

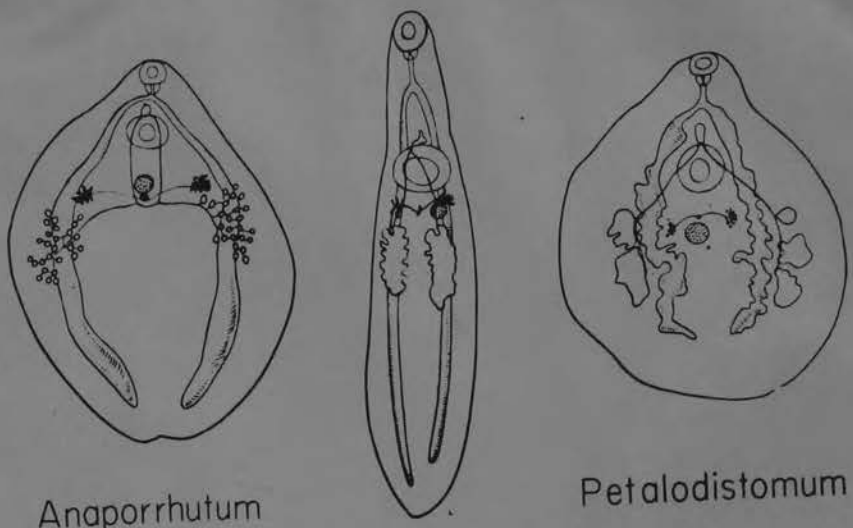
Nagaty's diagnosis of the genus *Nagmia* must be modified as follows: Large ANAPORRHUTINAE with the lateral and posterior borders forming nearly a semicircle. A muscular pharynx is present; the esophagus may be present or absent. Intestinal caeca branched. Testes extracaecal, follicular; the individual testis follicles united together by a series of ducts leading into the vasa efferentia. Vitelline glands intracaecal. A large receptaculum seminis is present.

Nagmia floridensis differs from *N. yorkei* in the shape and position of the ovary, this organ being lobed and to one side of the midline in the latter species, in possessing a longer esophagus, in having less highly sacculated intestinal caeca, and in having smaller testis follicles. *Nagmia pacifica* differs from both other species in the apparent total absence of the esophagus, the rudimentary nature of its intestinal sacculations, and in having larger and less numerous testis follicles.

1953 J.P.

PLATE II

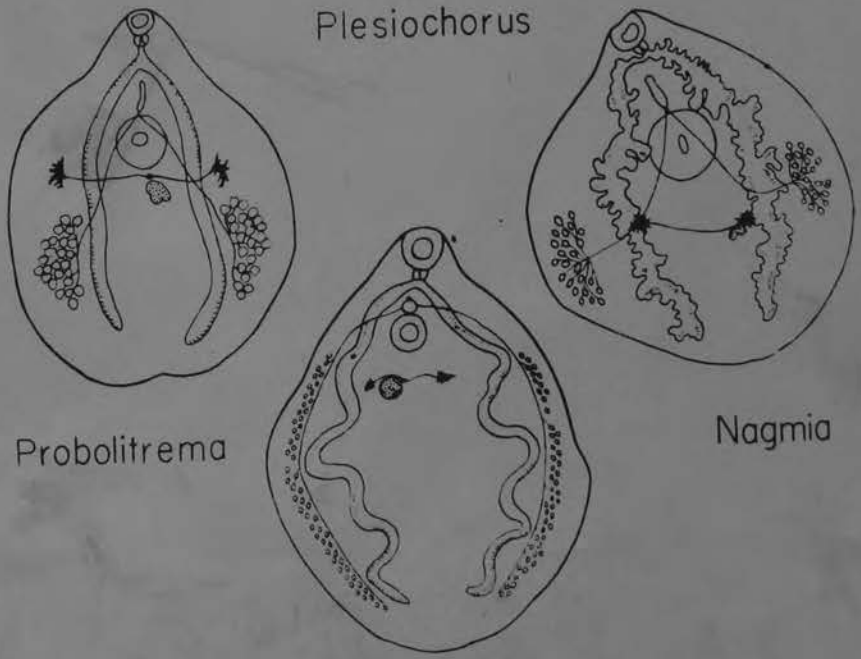
The Subfamily Anaporrhutinae



Anaporrhutum

Plesiochorus

Petalodistomum



Probolitrema

Nagmia

Staphylorchis

Diagnosis of the sub-family ANAPORRHUTINAE Looss, 1921.

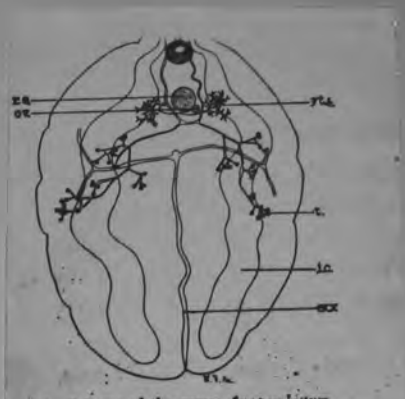
Medium to large Gorgoderidae with the posterior part of the body distinctly broad. Muscular pharynx present and usually connected with a short oesophagus. The terminal part of the genital tract is strongly developed. The vesicula seminalis is long and coiled. The ejaculatory duct and the metraterm (terminal part of the uterus) is elongated. Female genital organs without Laurer's canal, but with a strongly developed receptaculum seminis. Testes may be internal or external to the intestinal caeca. Vitelline glands apart from each other.

Diagnosis of the genus *Anaporrhutum* v. Ofenheim, 1900.

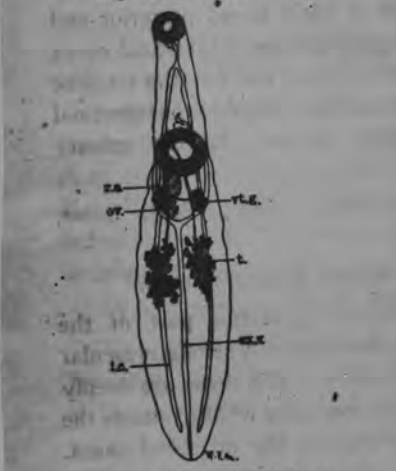
Large Anaporrhutinae with definitely broadened posterior part of the body. A strong muscular pharynx present; intestinal caeca not branched. The testes are divided into a large number of spherical bodies which are partly internal and partly external to the intestinal caeca. Vitelline glands are ventral and internal to the intestinal caeca. A large receptaculum seminis present. In the pericardium and body cavity of Elasmobranch fishes.

Type-species :—*Anaporrhutum albidium* v. Ofenheim, 1900.

Ofenheim (1900) also included in this genus *Anaporrhutum ricchiardii*; Looss (1901) made a new genus to accommodate this species on account of the fact that it differed from *Anaporrhutum albidium* in that the vitelline glands and the testes are completely outside the intestinal caeca, a difference of generic value.



(a) Scheme of the genus *Anaporrhutum*. Size of the type species is from 7·8 mm. × 4·8 mm. to 3·1 cm. × 1·2 cms.



(c) Scheme of the genus *Plesiochorus*. Size of the type species is from 2 mm. long to 1·2 cm. × 2·4 mm.

Diagnosis of the genus *Probolitrema* Looss, 1901.

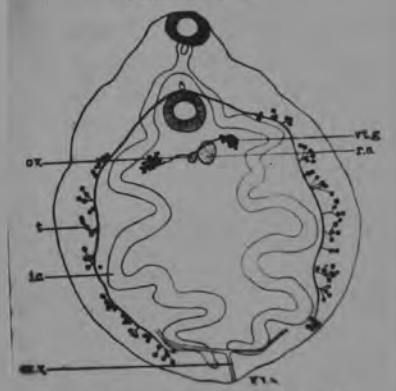
Large Anaporrhutinae with definitely broadened posterior part. A strong muscular pharynx present; intestinal caeca not branched. The testes are divided into a large number of irregularly shaped bodies and together with the vitelline glands are definitely external to the intestinal caeca. A large receptaculum seminis present. In the body cavity of Elasmobranch fishes.

Type-species :—*Probolitrema ricchiardii* (Lopez, 1888), Looss, 1901.

Diagnosis of the genus *Plesiochorus* Looss, 1902.

Middle-sized Anaporrhutinae with a fairly broad posterior end of the body. A strong muscular pharynx present; intestinal caeca not branched. Testes simple but deeply lobed and like the vitelline glands ventral and partly internal and partly external to the intestinal caeca. A large receptaculum seminis present. In the urinary bladder of the marine Chelonia.

Type-species :—*Plesiochorus cymbiformis* (Rúd., 1819), Looss, 1901.



(e) Scheme of the genus *Staphylorchis*.

Diagnosis of the genus *Staphylorchis* Travassos, 1920.

Large Anoporrhutinae with the posterior part more or less rounded. A strong muscular pharynx present, intestinal caeca sinuous but without diverticula. The testes are divided into a large number of small spherical bodies and are external to the intestinal caeca. Vitelline glands between the intestinal caeca. A large receptaculum seminis present. In the body cavity of rays, Australia.

Type-species :—*Staphylorchis cymatodes* (Johnston, 1913), Travassos, 1920.

From Nagaty 1930

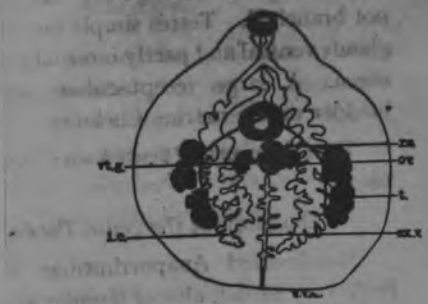
Diagnosis of the genus *Petalodistomum* Johnston, 1912.

Middle-sized Anaporrhutinae with the posterior part of the body very broad, almost circular and plate-like. A strong muscular pharynx present; intestinal caeca branched. The testes are deeply lobed and divided into several distinct pieces lying wholly outside the intestinal caeca. Vitelline glands internal to the intestinal caeca. A large receptaculum seminis present. Parasites in the sting ray.

Type-species :—*Petalodistomum polycladum* Johnston, 1912.

Johnston also included in this genus another species, *Petalodistomum cymatodes*. Travassos (1920) erected the new genus *Staphylorchis*, to accommodate *Petalodistomum cymatodes*, as he considers it more convenient to separate it from the genus *Petalodistomum* and make a new genus of it because it more resembles the genus *Anaporrhutum* than the genus *Petalodistomum*, and he further considers that the disposition of the caeca and of the testes appears to be sufficient for making a separate genus and that less differences exist between *Phylodistomum* and *Catroptroides* on one hand and between *Gorgodera* and *Gorgoderina*

(*b*) Scheme of the genus *Prolelitrema*. Size of the type species is from 6 mm. × 4·5 mm. to 1·9 cm × 1·3 cm.



(*d*) Scheme of the genus *Petalodistomum*. Size of the type species is from 3·3 × 3 mm. to 3·76 × 3·5 mm.

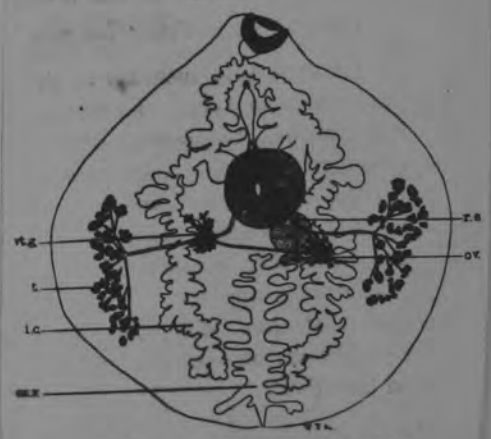
Diagnosis of the genus *Nagmia* n.gen.

Large Anaporrhutinae with the lateral and posterior borders forming nearly a semi-circle. A muscular pharynx as well as a short oesophagus is present. Intestinal caeca branched. Testes divided into a large number of irregularly-shaped bodies which are definitely outside the intestinal caeca. Vitelline glands between the intestinal caeca. A large receptaculum seminis present.

Type-species :—*Nagmia yorkei*.

This genus most closely resembles the genus *Petalodistomum* Johnston, 1912, but it differs from this mainly in the greater size of the new genus (the size given to *Petalodistomum polycladum* is 3·3 mm. to 3·76 mm. in length, and 3 mm. to 3·5 mm. in breadth; while that of the new species, *Nagmia yorkei*, is 1·6 cm. to 1·7 cm. in length, and 1·2 cm. to 1·6 cm. in breadth), in the shape of the vitelline glands, which are composed of two sets of small rounded follicles, these sets being close together in the genus *Petalodistomum*, while in the new genus they are composed of two sets each composed of tubular ramifications and are wide apart. Another very important difference is the greater number of the lobules of the testes in the new genus.

The type-species, *Nagmia yorkei*, and specimens of *Anaporrhutum largum* are kept in the Museum of the Liverpool School of Tropical Medicine.



(*f*) Scheme of the genus *Nagmia*. n.gen.

Table showing the main differences in the genera of the sub-family ANAPORRHUTINAE.

	Anaporrhutum	*Probolitrema*	*Plesiocherus.*	*Petalodistomum*	*Staphylorchis*	*Nagmia*
Muscular pharynx ...	Present.	Present.	Present.	Present.	Present.	Present.
Oesophagus... ...	Absent.	Very short.	Short.	Short.	Short.	Short.
Intestinal caeca ...	Unbranched.	Unbranched.	Unbranched.	Branched.	Sinuous but unbranched.	Branched.
Shape of testes ...	Divided into a large number of small, smooth, spherical bodies.	Divided into a large number of irregularly-shaped bodies.	Simple but deeply lobed.	Deeply lobed and divided into several large distinct pieces.	Divided into a large number of small spherical bodies.	Divided into a large number of irregularly-shaped bodies.
Relation of testes to intestinal caeca.	Partly internal and partly external.	Definitely external.	Partly internal and partly external.	Definitely external.	Definitely external.	Definitely external.
Position of testes ...	In the middle third of the body.	In the middle third of the body.	In the posterior half of the body.	In the posterior half of the body.	In the middle and posterior thirds of the body.	In the middle third of the body.
Receptaculum seminis.	Present.	Present.	Present.	Present.	Present.	Present.
Shape of vitelline glands.	Finely dendritic.	Finely dendritic.	Coarsely dendritic.	Composed of small spherical follicles.	Small follicles. Some spherical, some elongated.	Coarsely dendritic.
Relation of vitelline glands to intestinal caeca.	Ventral and internal.	Definitely external.	Partly internal and partly external.	Internal.	Definitely internal.	Ventral and internal.
[illegible] vitelline	In the anterior	In the anterior half of body.	In the anterior half of body.	Near mid transverse line.	In the anterior half of the body.	Near mid transver line.

From Nagaty
1930

GORGODERIDAE Looss, 1901

Family diagnosis. — See p. 378.

Key to subfamilies of Gorgoderidae from fishes

1. Pharynx absent 2
   Pharynx present 3
2. Ceca united posteriorly; testes, ovary and vitellaria close together in postacetabular intercecal area ..... Xystretinae
   Ceca not united posteriorly ..... Phyllodistominae
3. Vitellaria intercecal, testes cecal or extracecal .. Anaporrhutinae
   Vitellaria and testes extracecal ..... Probolitrematinae

Anaporrhutinae Looss, 1901

Subfamily diagnosis. — Gorgoderidae: Body oval in outline, somewhat pointed anteriorly in form of a cephalic cone. Pharynx present. Ceca more or less winding, may be provided with numerous outer and inner diverticula. Acetabulum near anterior extremity or pre-equatorial. Testes divided into numerous small follicles or few large lobed masses, cecal or extracecal. Ovary small, median or submedian, between two vitellaria. Large receptaculum seminis present. Vitellaria deeply lobed or branched, intercecal, postacetabular. Uterus intercecal. Excretory vesicle tubular, with or without side branches. Parasitic in body cavity of elasmobranchs.

Key to genera of Anaporrhutinae

Testes follicular, largely cecal, partly intercecal and partly extracecal; ceca slightly undulating ..... *Anaporrhutum*
Testes follicular, entirely extracecal; ceca strongly winding ..... *Staphylorchis*
Testes follicular, entirely extracecal, ceca with numerous outer and inner diverticula ..... *Nagmia*
Testes divided into few large lobed masses; ceca with numerous outer and inner diverticula ..... *Petalodistomum*

SEE KEY BY LAMOTHE (1969) WITH WINTERIA LAMOTHE, 1969

Anaporrhutum Ofenheim, 1900

Generic diagnosis. — Gorgoderidae, Anaporrhutinae: Body oval, small; forebody marked off from hindbody. Oral sucker followed by pharynx. Esophagus very short; ceca wide, without lateral outgrowths, reaching to posterior extremity. Acetabulum near anterior extremity. Testes consisting of grape-like symmetrical bunches of numerous small follicles, overreaching intestinal limbs. Genital pore immediately postbifurcal. Ovary small, compact, submedian, a short distance posterior to acetabulum. Large receptaculum seminis present. No Laurer's canal. Vitellaria dendritic, just inside ceca at level of ovary. Uterus intercecal. Excretory vesicle tubular, joining H-shaped collecting vessel at its tip. Parasitic in body cavity of rays.

Genotype: *A. albidum* Brandes in Ofenheim, 1900 (Pl. 7, Fig. 81), in body cavity and pericardium of *Aetobatis narinari;* Pacific. Also in *Chiloscyllium indicum.*

A. largum Lühe, 1906, was transferred by Baylis (1927) to *Staphylorchis* Travassos, but should be assigned in our opinion to *Nagmia* Nagaty.

Anaporrhutum albidum **E. v. OFENHEIM 1900.**
(fig. 3 et 4).

MATÉRIEL EXAMINÉ :

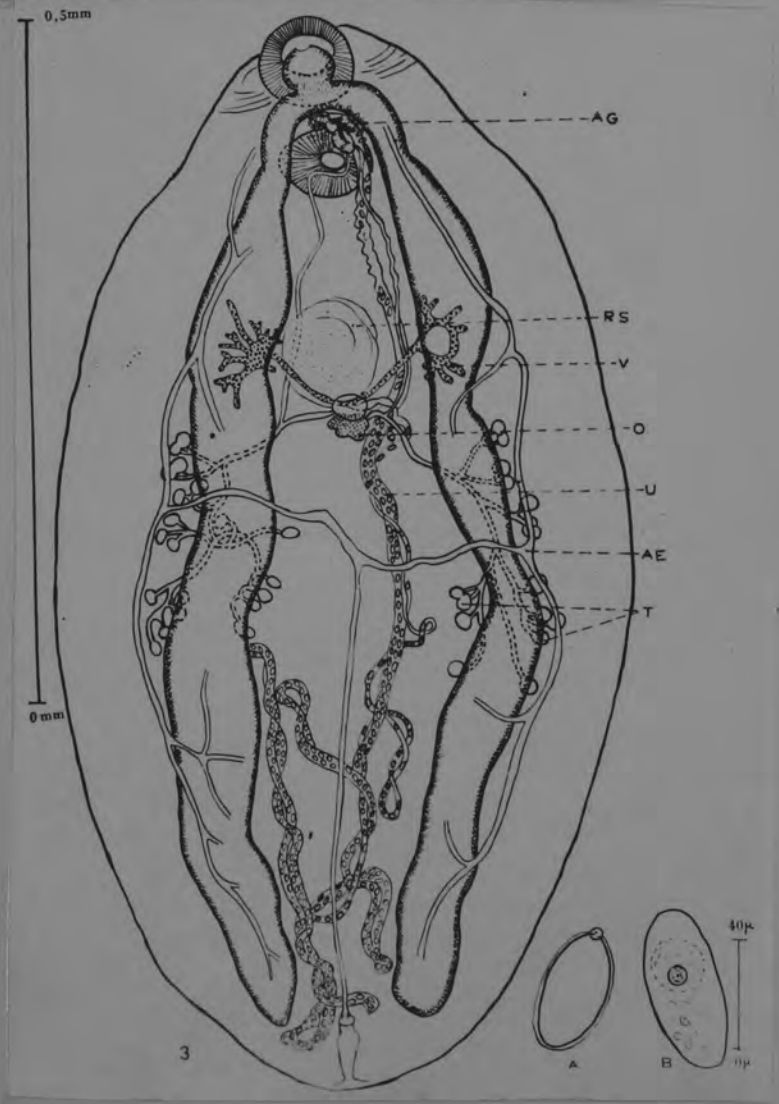
5 individus récoltés dans le péricarde du Sélacien *Taeniura lymma* (Forsk.) (*Dasyatiidae*), Nossibé août 1957. Madagascar

Description :

Corps plat de forme ovale à extrémités arrondies. Cuticule lisse. Ventouse orale terminale. Prépharynx nul. Pharynx globuleux. Œsophage presque nul. Branches intestinales parallèles aux bords latéraux et se terminant à l'extrémité postérieure du corps. Ventouse ventrale presque égale à la ventouse orale, située en arrière de la bifurcation intestinale.

Environ 40 follicules testiculaires globuleux, situés vers la moitié du corps, disposés latéralement et ventralement aux branches de l'intestin par groupes de 12 à 22. Les canalicules qui partent chacun d'un follicule se réunissent en plus gros canaux donnant naissance, de chaque côté, à un canal collecteur transversal. De chacun de ces canaux part un canal déférent qui, dans l'espace intercæcal, monte parallèlement aux branches intestinales. Les deux canaux déférents aboutissent à une vésicule séminale ovale à laquelle fait suite un canal éjaculateur. Le pore génital est situé en avant de la ventouse ventrale. Une vraie poche du cirre ne semble pas exister. De nombreuses cellules prostatiques entourent la vésicule séminale.

Ovaire de petite taille, légèrement lobé, situé au milieu de la largeur du corps, en arrière du tiers antérieur. Réservoir vitellin situé entre l'ovaire et un volumineux receptaculum seminis, contenant



From: Razarihelisoa, 1959

des spermatozoïdes. Vitellogènes ramifiés situés ventralement au contact des branches de l'intestin à la même hauteur que le receptaculum seminis. Utérus présentant d'abord une branche descendante, formant un peloton dans la région intercæcale postérieure, donnant ensuite une branche ascendante bourrée d'œufs.

Les œufs de forme ovale, sont pourvus d'un mucron postérieur (fig. 4a). Vessie en I recevant à son extrémité antérieure les deux canaux collecteurs principaux orientés transversalement. Chacun reçoit un conduit latéral parallèle aux branches intestinales. Ces deux conduits latéraux présentent de nombreuses ramifications.

Dimensions :

Longueur	8,0 mm	12,5 mm
Largeur	4,4 mm	7,0 mm
Ventouse orale	610 × 690 µ	732,2 × 769 µ
Ventouse ventrale	506 × 535 µ	690 × 769 µ
Œufs	47,2 × 25,0 µ	
	55,4 × 27,7 µ	
	44,0 × 22,2 µ	

Discussion :

Nous avons rapporté à *Anaporrhutum albidum* E.v. Ofen. 1900 le distome que nous avons récolté dans le péricarde de *Taeniura lymma* (Forsk.), car il correspond par l'ensemble des caractères à ceux donnés par OFENHEIM. Le genre a été créé pour un *Digenea* présentant des testicules folliculaires répartis sur les caecums ou situées en partie en dedans, en partie en dehors de ceux-ci. L'espèce a été nommée *A. albidum*.

Dans sa publication sur les *Trématodes Digenea des Sélaciens* R. Ph. DOLLFUS (1937, p. 59-60, 261) a donné les indications suivantes :

« *A. albidum* E. v. Ofenheim 1900 (p. 147-169, 185-186, fig. texte pl. III fig. 1-8) a été décrit d'après 15 exemplaires récoltés par SCHAUINSLAND au cours d'un « Reise nach dem Pacific » en 1896-97, dans le cœlome et le péricarde d'*Aetobatis narinari* (Euph. 1790).

T. SOUTHWELL (1913, p. 101-102) a signalé la récolte d'un grand nombre d'*A. albidum* Ofen. à la surface du foie de *Chiloscyllium indicum* (Gmelin, 1789) pris sur les Ceylon Pearl Banks. Ces spécimens différaient de la description d'OFENHEIM en ayant la ventouse ventrale beaucoup plus grande et les testicules moins dispersés. Ce dernier fait, dit SOUTHWELL, peut être dû à ce que les testicules n'étaient pas complètement développés chez ces spécimens ».

A. albidum montre ainsi une distribution géographique très vaste, englobant le Pacifique et l'Océan Indien.

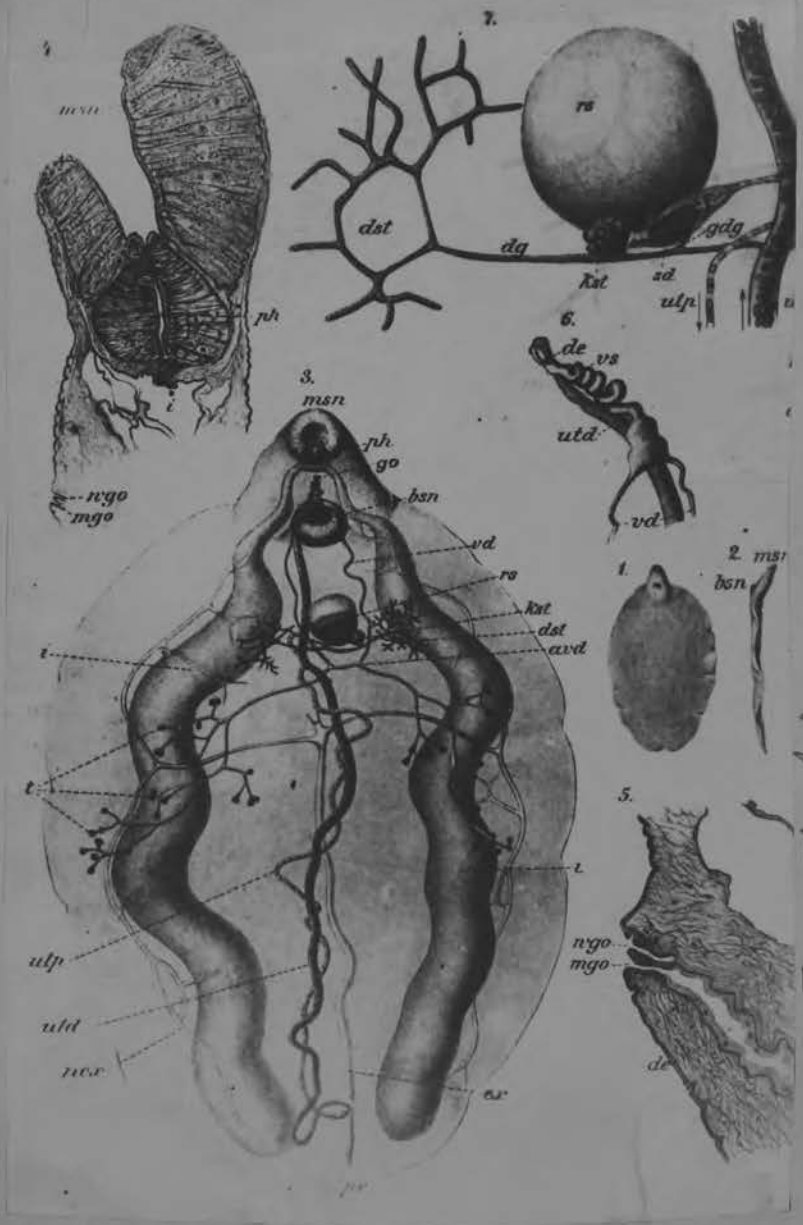
Les hôtes hébergeant cette espèce sont des Sélaciens : *Chiloscyllium indicum* (Gmelin 1789) est un Squaloïde de la famille des *Orectolobidae* ; *Aetobatis narinari* (Euph. 1790) est un Batoïde de la famille des *Myliobatiidae* ; *Taeniura lymma* (Forsk. 1775) est un [illegible] de la famille des *Dasyatiidae*.

Dans la systématique actuelle, ce genre est placé dans la famille des *Gorgoderidae* A. Looss 1901, ce qui est critiquable d'après R. Ph. DOLLFUS.

Anaporrhutum albidum, Ofenh. from Southwell 1913

Large numbers of this Trematode were obtained in 1911 from the surface of the liver of a *Chiloscyllium indicum*, caught on the Ceylon Pearl Banks. They differed from Ofenheim's description and figure (7) in (i) having the ventral sucker much larger than

fully developed in our specimens. Ofenheim's specimens were from *Actobatis narinari*.



"After Ofenheim" From Pratt, 1902

From Ofenheim 1900

Ex. Narcine timlei
(Bl. and Schn.),
Torpenidae

Madras, Bay of
Bengal

om: Hafeezullah,
1971

Anaporrhutum largum, Lühe. (5) from Southwell, 1913

This Trematode was first obtained by Prof. Herdman in Ceylon from the coelom of *Rhinoptera javanica*. He only obtained a single specimen. Large numbers of this species have since been obtained by Southwell in Ceylon, from the coelom of *Chiloscyllium indicum*, *Ginglymostoma concolor* and *Aetobatis narinari*.

A species of *Anaporrhutum* was also obtained by Dr. Jenkins from the coelom of *Stegostoma tigrina*, caught off the Orissa coast on December 15th, 1910.

It differed from the Ceylon specimens of this species in the following points :—

Orissa specimens.	*Ceylon specimens.*
(*a*) Leaf-like in outline.	(*a*) More circular in outline.
(*b*) Internal wall of the gut thrown into steep ridges.	(*b*) Ridges not well marked.

Besides the preceding points the testes and vitteline glands in the specimens collected by Dr. Jenkins were but feebly developed. At first, this seemed a striking difference, but I am inclined to think that the species are the same in spite of the differences named.

The three species of *Anaporrhutum*, viz. *A. largum*, *A. albidum* and *A. richiardii*, appear to be widely distributed amongst Elasmobranchs in Indian waters.

Anaporrhutum largum, n. sp.—Plate II., fig. 17. Lühe, 1906

From the body cavity of *Rhinoptera javanica*; Kalpitiya. A single specimen.

Body very flat, membranous, smooth, oval, 9 millims. long, 8 millims. broad; the greatest breadth just behind the ventral sucker.

Oral sucker subterminal, oval, with a longitudinal diameter of 0·85 millim. and a transverse diameter of 0·8 millim. Ventral sucker very large, but little excavated, slightly oval, with a longitudinal diameter of 2 millims., and a transverse diameter of 2·2 millims. Distance of the two suckers from each other 1·5 millims. Distance of the posterior margin of the ventral sucker from the posterior end of the body 4·8 millims.

Pharynx 0·42 millim. long and 0·43 millim. broad, not projecting into the oral sucker (as it does in *A. albidum*, Odhner). Œsophagus short, about 0·6 millim. long. Intestinal cæca large and long, end about 1 millim. in front of the posterior end of the body, enclosing a space smaller than that between their outer edge and the lateral margins of body. This broadening of the parts outside the intestinal cæca, together with the excessive diameter of the ventral sucker and the extreme thinness of the whole body, gives to the species a characteristic appearance, different from that of the other Anaporrhutinæ.

Excretory vesicle Y-shaped, with long median trunk, dividing a little behind the level of the posterior end of the yolk glands, and with shorter paired branches not crossing the intestinal cæca, but ending at the sides of the posterior edge of the ventral sucker.

Genital openings ventral from pharynx, somewhat at the right of the median line. Cirrus-pouch wanting.

Testes outside the intestinal cæca, but still within a distance of almost 2 millims. from the lateral margins of the body, extending from 0·5 millim. behind the posterior margin of the ventral sucker to 1·8 millim. behind the same. Their number is 14 at the right side of the body and 17 at the left side, pressed closely together in two rows which unite behind; the inner edge of these rows has but about half the length of the outer. Each testis is mulberry-shaped. The vasa efferentia from the single testes arise between the two rows and unite soon to form the vas deferens of each side. The two vasa deferentia do not anastomose with each other, as they are said to do in *A. albidum*, but only unite at about the level of the division of the intestinal cæca to form a very convoluted vesicula seminalis.

Ovary globular, with a diameter of 0·4 millim. It is situated just behind the ventral sucker, at the right side of the body. Receptaculum seminis of about the same size, situated at the side of the ovary in the median line. Yolk glands between the intestinal cæca and the paired branches of the excretory vesicle, the left just behind the ovary, and the right symmetrically on the other side of the body, each of them consisting of several tubules, which do not anastomose with each other, as they are said to do in *Anaporrhutum albidum*, Odhner, and *Probolitrema capense*, Looss.*

Uterus similar to that of *Probolitrema richiardi* (Lor.) Looss, but ending about 0·7 millim. in front of the blind end of the intestinal cæca, and passing at the right side of the ventral sucker.

The new species *Anaporrhutum largum* differs from both *Anaporrhutum albidum*, Odhner, and the two species of the genus *Probolitrema*, Looss (*P. richiardi* and *P. capense*), in several points of its anatomy, especially in the position of the testes and the yolk glands, to which Looss has ascribed generic value. Accepting *Probolitrema* as a separate genus it would be necessary therefore to create a third genus for the new species. But doubtless all these Anaporrhutinæ living in the body cavity of Selachians are more closely related to each other than to *Pleurocerca cymbiformis* (Rud.) placed by Looss in the same sub-family. It seems to me, therefore, that *Probolitrema* is to be regarded only as a sub-genus of *Anaporrhutum*, or

* In addition to *Anaporrhutum largum* I have also examined a species of *Probolitrema* very similar to *P. richiardi* (Looss), if not identical with this, which is found in an undetermined shark from the Ullo Sea (Dutch India), and belongs to the Natural History Museum of Hamburg (No. 17305). In this species also the tubules of the yolk glands do not anastomose with each other.

Anaporrhutum richiardii, Lopez. (7). From Southwell 1913

About six specimens of this Trematode were obtained from the surface of the liver of *Aetobatis narinari*, caught on the Ceylon Pearl Banks in 1911.

Anaporrhutum stunkardi ~~n. sp.~~ TANDON, 1969

It is an elongated, moderate sized worm measuring 10.95 × 3.32 mm. without depressions at the sides of the suckers. Cuticular scales are not present. The oral sucker is terminal (0.62 × 0.75 mm) and is overlapped posteriorly by a muscular pharynx 0.45 mm in diameter. An oesophagus is absent. The intestinal caeca are unbranched and slightly sinuous, being wider anterior to the testes and then narrowing in the rest of the body. The caeca end 0.54 mm from the posterior end of the body. The ventral sucker is smaller than the oral sucker and measures 0.5 × 0.6 mm. It is located 0.95 mm from the oral sucker.

The follicular testes lie both internal and lateral to the caeca as well as ventral to them, just within the posterior half of the body. The right testis is 1.62 mm long, while the left measures 2.6 mm. The right has 26 follicles and the left only 25. The vesicula seminalis and the ejaculatory duct lie anterior to the ventral sucker and are enclosed in a cirrus pouch. The genital pore is postbifurcal and 0.14 mm away from the intestinal bifurcation.

The female reproductive complex in the anterior half of the body is 3.72 mm from the anterior end. The ovary is lobed and the 3–4 lobes present in its anterior region unite into one posteriorly, giving it a conical appearance. It measures 0.36 mm in length and 0.33 mm at its maximum width. The receptaculum seminis, measuring 0.2 mm in diameter, lies anterior to the ovary towards its left. The vitellaria consist of profusely branching structures, lying lateral to the ovary, somewhat more anterior than posterior to it. They lie internal and ventral to the intestinal caeca, covering their entire width. There are 34–36 branches in the right and 30–32 in the left vitellaria. The uterine coils lie between the caeca, occupying the entire inter-caecal space from the level of the testes to the end of the caeca and extending beyond them to 0.22 mm from the end of the body. Anterior to the testes the uterus is continued more or less as a single tube, till it opens beside the male genital aperture. The oval and operculated eggs are 0.052 — 0.062 × 0.026 — 0.032 mm.

The excretory bladder is elongated and its lumen narrows down towards the end, giving it a pipette-like shape. The excretory pore lies in the median line at the end of the body.

A few specimens of the worm were provided from a formalin fixed specimen of the common shark *Scoliodon dumerilli*, of Bharat, by my colleague Dr. B. K. Tandon. The specimens were well preserved and when stained in borax carmine, satisfactory preparations were made. The worms proved to be new to science, and a new species of *Anaporrhutum* has been created.

The species has been named in honour of Prof. H. W. Stunkard, the well known Helminthologist.

Fig. 1. *Anaporrhutum stunkardi* n. sp. Ventra

Discussion

So far only two species of the genus *Anaporrhutum* have been described from rays and none from shark. This is the first record of the genus from India.

Anaporrhutum stunkardi n. sp. differs from both *A. albidum* Ofenheim (1900) and *A. mantae* Nagaty and Aal (1961) with regard to the shape and size of the body, arrangement and number of the follicles of the testes, the variable extent of the right and left testes, branching of the vitellaria (their being both inter-caecal and ventral in the present form), the lobed and conical ovary, and the size of the eggs.

ANAPORRHUTUM